# Fronius IG Plus

## 3.0-1 / 3.8-1 / 5.0-1 / 6.0-1 / 7.5-1

## 10.0-1 / 11.4-1 / 11.4-3 / 12.0-3

USA Operating Instructions

Inverter for grid-connected photo-voltaic systems

Fronius

POWERING YOUR FUTURE

42,0426,0071,EA 01/2010

# Dear reader,

USA

**Introduction**

Thank you for the trust you have placed in our company and congratulations on buying this high-quality Fronius product. These instructions will help you familiarize yourself with the product. Reading the instructions carefully will enable you to learn about the many different features it has to offer. This will allow you to make full use of its advantages.

Please also note the safety rules to ensure greater safety when using the product. Careful handling of the product will repay you with years of safe and reliable operation. These are essential prerequisites for excellent results.

# IMPORTANT SAFETY INSTRUCTIONS
# SAVE THESE INSTRUCTIONS

**General**

These operating instructions contain important instructions for the Fronius IG Plus that must be followed during installation and maintenance of the inverter.

The Fronius IG Plus is designed and tested according to international safety requirements, but as with all electrical and electronic equipment, certain precautions must be observed when installing and/or operating the Fronius IG Plus.
To reduce the risk of personal injury and to ensure the safe installation and operation of the Fronius IG Plus, you must carefully read and follow all instructions and safety instructions in these operating instructions.

**Safety instructions**

The following section "Safety instructions" contains various warnings. A Warning describes a hazard to equipment or personnel. It calls attention to a procedure or practice, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the Fronius inverter and/or other equipment connected to the Fronius inverter or personal injury.

**Electrical installations**

All electrical installations must be carried out in accordance with the National Electrical Code, ANSI/NFPA 70, and any other codes and regulations applicable to the installation site.

For installations in Canada, the installations must be done in accordance with applicable Canadian standards.

# Safety rules

## Safety Rules Explanation

**DANGER!** Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

**WARNING!** Indicates a potentially hazardous situation which, if not avoided, will result in death or serious injury.

**CAUTION!** Indicates a potentially harmful situation which, if not avoided, may result in minor and moderate injury or property damage.

**NOTE!** Indicates a risk of flawed results and possible damage to the equipment.

**IMPORTANT!** Indicates tips for correct operation and other particularly useful information. It does not indicate a potentially damaging or dangerous situation.

If you see any of the symbols depicted in the "Safety rules," special care is required.

## General

The device is manufactured using state-of-the-art technology and according to recognized safety standards. If used incorrectly or misused, however, it can cause

- injury or death to the operator or a third party,
- damage to the device and other material assets belonging to the operator,
- inefficient operation of the device

All persons involved in commissioning, maintaining and servicing the device must

- be suitably qualified,
- have knowledge of and experience in dealing with electrical installations and
- read and follow these operating instructions carefully

The operating instructions must always be at hand wherever the device is being used. In addition to the operating instructions, attention must also be paid to any generally applicable and local regulations regarding accident prevention and environmental protection.

All safety and danger notices on the device

- must be kept in a legible state
- must not be damaged/marked
- must not be removed
- must not be covered, pasted or painted over

For the location of the safety and danger notices on the device, refer to the section headed "General" in the operating instructions for the device.

Before switching on the device, remove any faults that could compromise safety.

**Your personal safety is at stake!**

**Utilization in Accordance with "Intended Purpose"**

The device is to be used exclusively for its intended purpose.

Utilization for any other purpose, or in any other manner, shall be deemed to be "not in accordance with the intended purpose." The manufacturer shall not be liable for any damage resulting from such improper use.

Utilization in accordance with the "intended purpose" also includes

- carefully reading and obeying all the instructions and all the safety and danger notices in the operating instructions
- performing all stipulated inspection and servicing work
- installation as specified in the operating instructions

The following guidelines should also be applied where relevant:

- Regulations of the power supply company regarding energy fed into the grid
- Instructions from the solar module manufacturer

**Environmental Conditions**

Operation or storage of the device outside the stipulated area will be deemed as "not in accordance with the intended purpose." The manufacturer is not responsible for any damages resulting from unintended use.

For exact information on permitted environmental conditions, please refer to the "Technical data" in the operating instructions.

**Qualified Service Engineers**

The servicing information contained in these operating instructions is intended only for the use of qualified service engineers. An electric shock can be fatal. Do not perform any actions other than those described in the documentation. This also applies to those who may be qualified.

All cables and leads must be secured, undamaged, insulated and adequately dimensioned. Loose connections, scorched, damaged or inadequately dimensioned cables and leads must be immediately repaired by authorized personnel.

Maintenance and repair work must only be carried out by authorized personnel.

It is impossible to guarantee that externally procured parts are designed and manufactured to meet the demands made on them, or that they satisfy safety requirements. Use only original replacement parts (also applies to standard parts).

Do not carry out any modifications, alterations, etc. without the manufacturer's consent.

Components that are not in perfect condition must be changed immediately.

**Safety Measures at the Installation Location**

When installing devices with openings for cooling air, ensure that the cooling air can enter and exit unhindered through the vents. Only operate the device in accordance with the degree of protection shown on the rating plate.

**Data Regarding Noise Emission Values**

The inverter generates a maximum sound power level of < 80 dB(A) (ref. 1 pW) when operating under full load in accordance with IEC 62109-1.

The device is cooled as quietly as possible with the aid of an electronic temperature control system, and depends on the amount of converted power, the ambient temperature, the level of soiling of the device, etc.

It is not possible to provide a workplace-related emission value for this device, because the actual sound pressure level is heavily influenced by the installation situation, the power quality, the surrounding walls and the properties of the room in general.

**EMC device classifications**

Devices with emission class A:

- are only designed for use in an industrial setting
- can cause line-bound and radiated interference in other areas

Devices with emission class B:

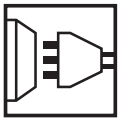
- satisfy the emissions criteria for residential and industrial areas. This is also true for residential areas in which the energy is supplied from the public low voltage grid.

EMC device classification as per the rating plate or technical data.

**EMC Measures**

In certain cases, even though a device complies with the standard limit values for emissions, it may affect the application area for which it was designed (e.g., when there is sensitive equipment at the same location, or if the site where the device is installed is close to either radio or television receivers). If this is the case, then the operator is obliged to take appropriate action to rectify the situation.

**Grid Connection**



High-performance devices (> 16 A) can affect the voltage quality of the grid because of a high output current in the main supply.

This may affect a number of types of device in terms of:

- connection restrictions
- criteria with regard to maximum permissible mains impedance *)
- criteria with regard to minimum short-circuit power requirement *)

*) at the interface with the public grid

see Technical Data

In this case, the operator or the person using the device should check whether or not the device is allowed to be connected, where appropriate through discussion with the power supply company.

**Electrical Installations**

Electrical installations must only be carried out according to relevant national and local standards and regulations.

**Protective Measures against ESD**

Danger of damage to electrical components from electrical discharge. Suitable measures should be taken to protect against ESD when replacing and installing components.

**Safety Measures in Normal Operation**

Only operate the device when all protection devices are fully functional. If the protection devices are not fully functional, there is a risk of

- injury or death to the operator or a third party,
- damage to the device and other material assets belonging to the operator,
- inefficient operation of the device

Any safety devices that are not functioning properly must be repaired by authorized personnel before the device is switched on.

Never bypass or disable protection devices.

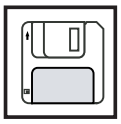
**Safety Symbols**

Devices with the CE marking satisfy the essential requirements of the low-voltage and electromagnetic compatibility directives. (Further details can be found in the appendix or the chapter entitled "Technical data" in your documentation.)

**Disposal**

Do not dispose of this device with normal domestic waste! To comply with the European Directive 2002/96/EC on Waste Electrical and Electronic Equipment and its implementation as national law, electrical equipment that has reached the end of its life must be collected separately and returned to an approved recycling facility. Any device that you no longer require must be returned to your dealer, or you must locate the approved collection and recycling facilities in your area. Ignoring this European Directive may have potentially adverse affects on the environment and your health!

**Backup**



The user is responsible for backing up any changes made to the factory settings. The manufacturer accepts no liability for any deleted personal settings.

**Copyright**

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# General Information

# Protection of Persons and Equipment



**Safety**

**WARNING!** An electric shock can be fatal. Danger from grid voltage and DC voltage from solar modules.

- The connection area should only be opened by a licensed electrician.
- The separate power stage set area should only be disconnected from the connection area after first being disconnected from the grid power.
- The separate power stage set area should only be opened by Fronius-trained service personnel.

Never work with live wires! Prior to all connection work, make sure that the AC and DC wires are not charged.

**WARNING!** If the equipment is used or tasks are carried out incorrectly, serious injury or damage may result. Only qualified personnel are authorized to install your inverter and only within the scope of the respective technical regulations. It is essential that you read the "Safety regulations" chapter before commissioning the equipment or carrying out maintenance work.

**Protection of Persons and Equipment**

The design and function of the inverter offer a maximum level of safety, both during installation as well as operation.

The inverter provides operator and equipment protection through:

a) galvanic isolation
b) monitoring the grid

**Galvanic isolation**

The inverter is equipped with a high frequency transformer that ensures galvanic isolation between the DC side and the grid, thus ensuring the highest possible safety.

**Monitoring the Grid**

Whenever conditions in the electric grid are inconsistent with standard conditions (for example, grid switch-off, interruption), the inverter will immediately stop operating and interrupt the supply of power into the grid.

Grid monitoring is carried out using:

- Voltage monitoring
- Frequency monitoring
- Monitoring islanding conditions

**Information on "field adjustable trip points"**

The inverter is equipped with field adjustable trip points. For further information, please contact Fronius technical support at the following e-mail address: pv-us-support@fronius.com.

**FCC compliance**

This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions:
(1) This device may not cause harmful interference, and
(2) This device must accept any interference received, including interference that may cause undesired operation.

**Ground fault detector / interrupter**

The inverter is equipped with a ground fault detection and interruption (GFDI) circuit as required by UL 1741 and the National Electrical code.
Depending on the system configuration either the PV array's negative or positive conductor is connected to the grounding system in the inverter. If a ground fault occurs in the DC wiring, the inverter disconnects from the grid.

**Standards and regulations**

Your inverter complies with the requirements for the following standards "Inverters, converters and controllers for use in independent power systems":

- UL1741-2005
- IEEE 1547-2003
- IEEE 1547.1
- ANSI / IEEE C62.41
- C22.2 No. 107.1-01 (Sep. 2001)

The ground-fault detection and interruption is in compliance with NEC 690 building code requirements.

**Declaration of conformity**

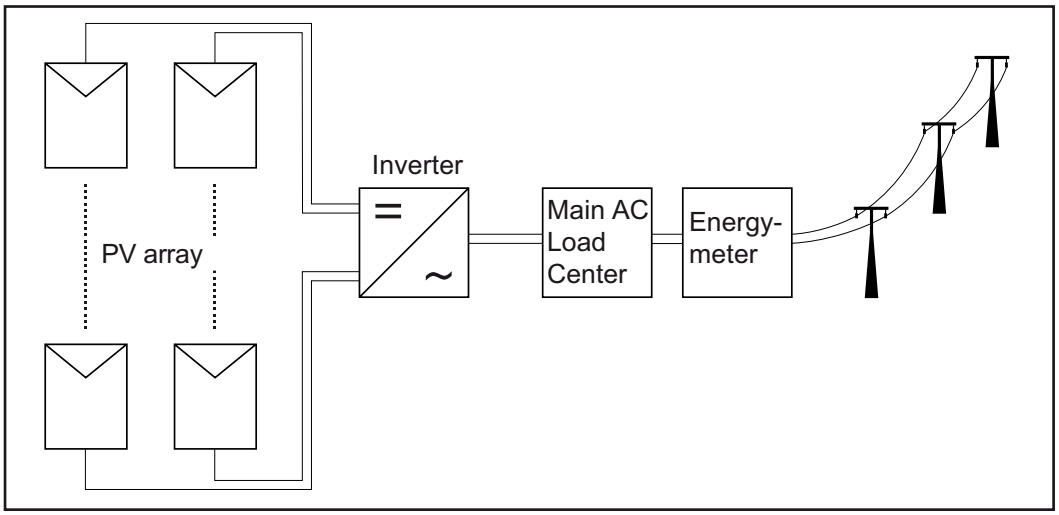
Relevant declarations of conformity can be found in the appendix to these operating instructions.

# The Fronius IG Plus Unit in the PV System



**General**

The solar inverter is the highly complex link between the solar modules and the public grid.




**Tasks**

The main tasks of the inverter include:

- Converting DC to AC current
- Fully automatic operational management
- Display function and data communication

**Converting DC to AC Current**

The inverter transforms the direct current generated by the solar modules into alternating current. This alternating current is fed into your home system or into the public grid and synchronized with the voltage that is used there.

**IMPORTANT!** The inverter has been designed exclusively for use in grid-connected photovoltaic systems. It cannot generate electric power independently of the grid.

**Fully Automatic Operational Management**

The inverter is fully automatic. Starting at sunrise, as soon as the solar modules generate enough power, the automatic control unit starts monitoring voltage and frequency. As soon as there is a sufficient level of irradiance, your solar inverter starts feeding energy to the grid.

The inverter control system ensures that the maximum possible power output is drawn from the solar modules at all times.
This function is called MPPT (Maximum Power Point Tracking).

As dusk starts and there is no longer sufficient energy available to feed power into the grid, the inverter unit shuts down the grid connection completely and stops operating. All settings and recorded data are saved.

**Display function and data communication**

The display on the inverter is the interface between the inverter and the operator. The design of the display is geared towards simple operation and making system data available as long as the inverter operates.

The inverter is equipped with a basic logging function to monitor minimum and maximum data on a daily and a cumulative basis. These values are shown on the display.

A wide range of data communication products allows for many possibilities of recording and viewing data.

**System upgrade**

The inverter is designed for various system upgrades, e.g.:

- Upgrades that enable the inverter to communicate with external system upgrades as well as other inverters
- Datalogger and modem interface as well as an Ethernet/Internet connection (for using a PC to record and manage data from your photovoltaic system)
- Various large-format displays
- Fronius Personal Display
- Actuators (e.g.: relays, alarms)
- Interface cards

System upgrades are available as plug-in cards.

**Forced Ventilation**

The inverter's temperature-controlled, variable-speed fan with ball-bearing support provides:

- optimal inverter cooling
- efficiency increases
- cooler components, thus improving service life
- least possible energy consumption and lowest possible noise level
- weight reduction due to a reduction of the cooling element surface

**Power Derating**

Should there be insufficient heat dissipation in spite of the fan operating at maximum speed (for example, inadequate heat transfer away from the heat sinks), the power will be derated to protect the inverter when the ambient temperature reaches 40 °C and above.

Derating the power reduces the output of the inverter for a short period sufficient to ensure that the temperature will not exceed the permissible limit.
Your inverter will remain ready for operation as long as possible without any interruption.

# Installation and Startup

# Fronius IG Plus Installation and Connection

USA

## Safety

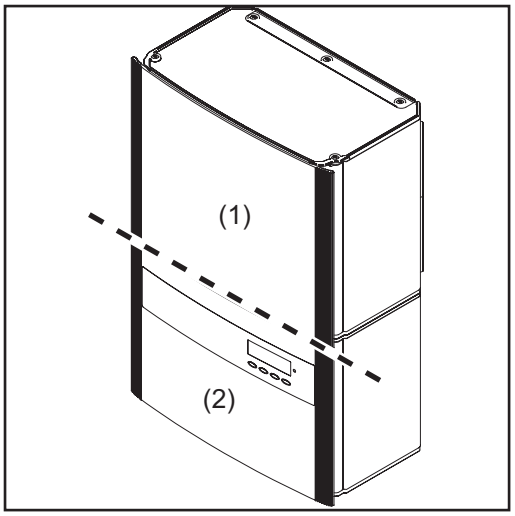
**WARNING!** An electric shock can be fatal. Danger from grid voltage and DC voltage from solar modules.

- The connection area should only be opened by a licensed electrician.
- The separate power stage set area should only be disconnected from the connection area after first being disconnected from the grid power.
- The separate power stage set area should only be opened by Fronius-trained service personnel.

Never work with live wires! Prior to all connection work, make sure that the AC and DC wires are not charged.

**WARNING!** If the equipment is used or tasks are carried out incorrectly, serious injury or damage may result. Only qualified personnel are authorized to install your inverter and only within the scope of the respective technical regulations. It is essential that you read the "Safety regulations" chapter before commissioning the equipment or carrying out maintenance work.

## Fronius IG Plus Construction

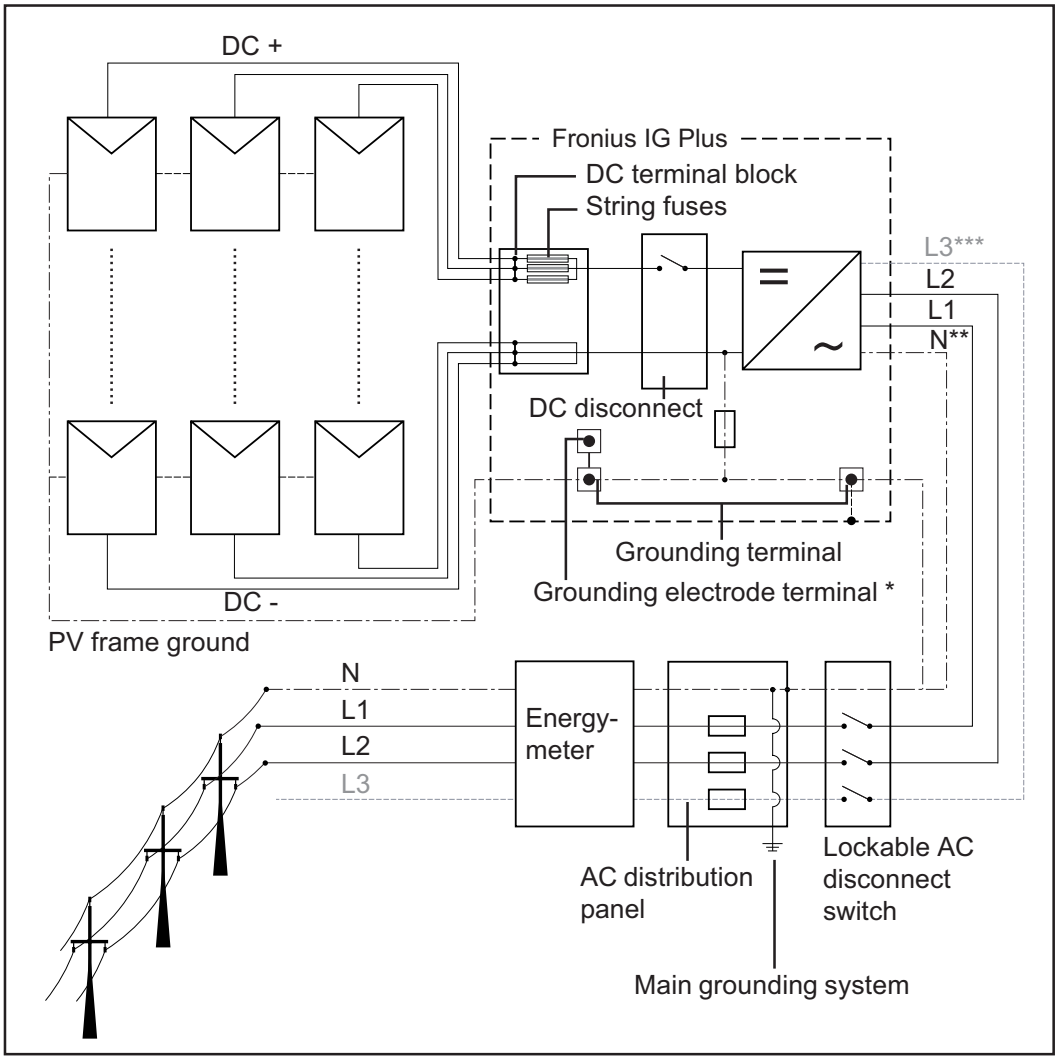



The power stage set and the connection area are separated from each other for delivery.

(1) Power stage set(s)

(2) Connection area

**Connection diagram**




* may be required by local authorities

** may be required depending on grid configuration

*** depending on inverter type

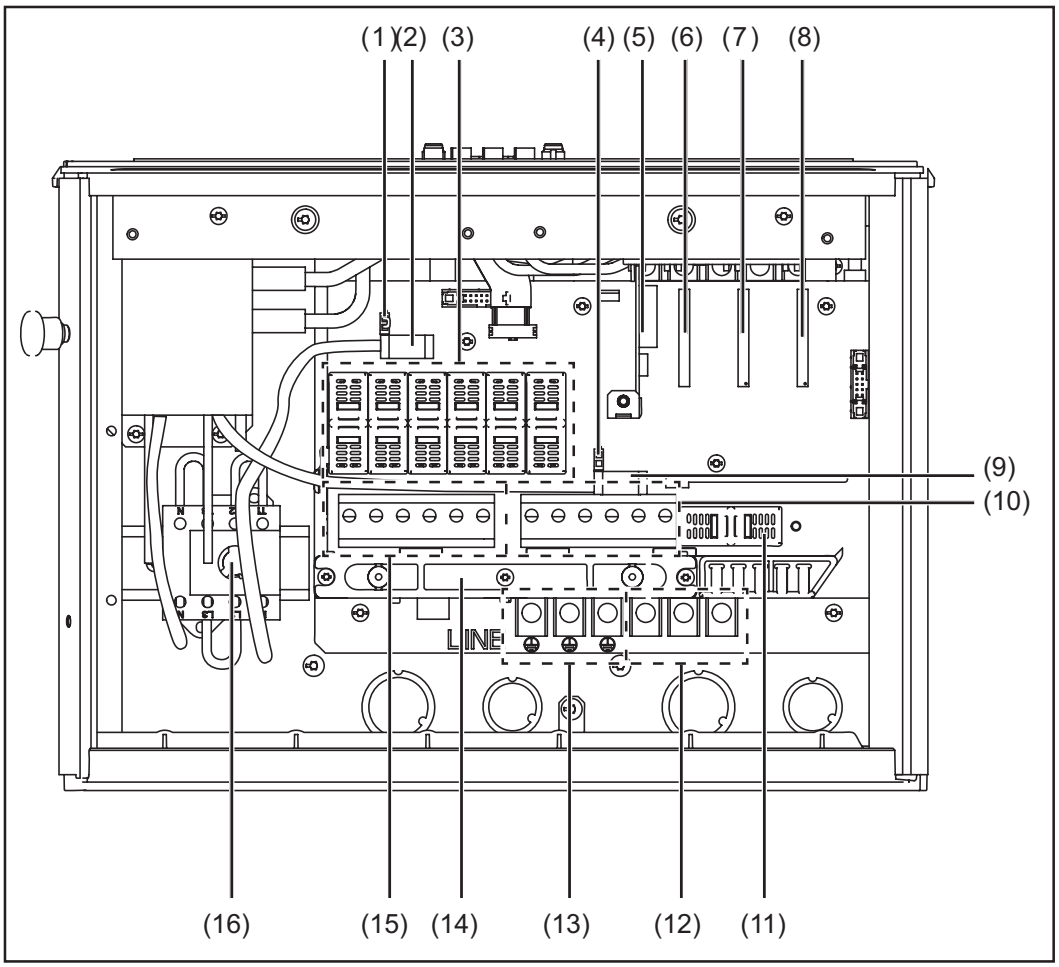
**Overview**

'Fronius IG Plus installation and connection' contains the following sections:

- Fronius IG Plus connection options
- Knockouts on the Fronius IG Plus
- Choosing the location
- Fronius IG Plus installation
- Connecting the Fronius IG Plus to the public grid (AC)
- Connecting solar module strings to the Fronius IG Plus (DC)
- Attaching power stage sets and closing the Fronius IG Plus

# Fronius IG Plus Connection Options

**Fronius IG Plus Connection Options**




| Item | Description |
|---|---|
| (1) | Jumper slot SMON |
| (2) | DC+ main switch wire |
| (3) | 6 x fuse holder with fuse cover, for stringfuses |
| (4) | Jumper slot SMOFF |
| (5) | Plug-in card IG Brain |
| (6) | Open card slot for an option card |
| (7) | Open card slot for an option card |
| (8) | Plug-in card NL-MON<br>Only at Fronius IG Plus 12.0-3 WYE 277: Open card slot for an option card |
| (9) | DC- main switch wire |
| (10) | 6 DC- terminals |
| (11) | fuse holder with fuse cover, for GFDI-fuse |
| (12) | AC-side terminals |
| (13) | 3 x grounding terminals |
| (14) | Strain relief for solar module strings |
| (15) | 6 DC+ terminals |
| (16) | DC main switch |

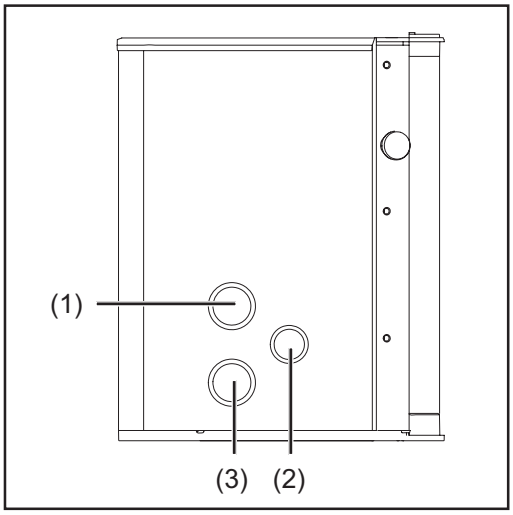
# Knockouts on the Fronius IG Plus

**General**

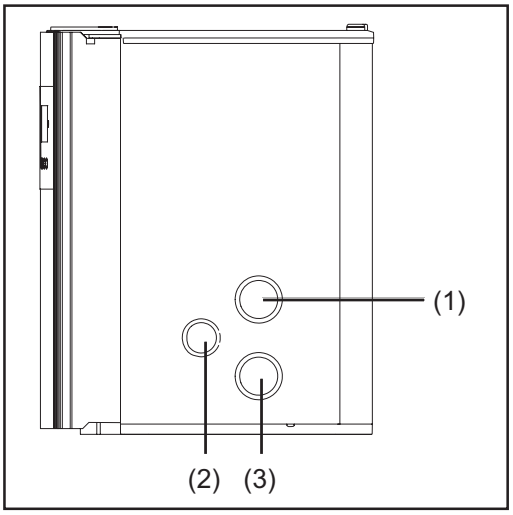
The inverter contains several knockouts of different sizes. When knocked out, the openings are used for the inputs of various wires.

**Knockouts for wire inputs**

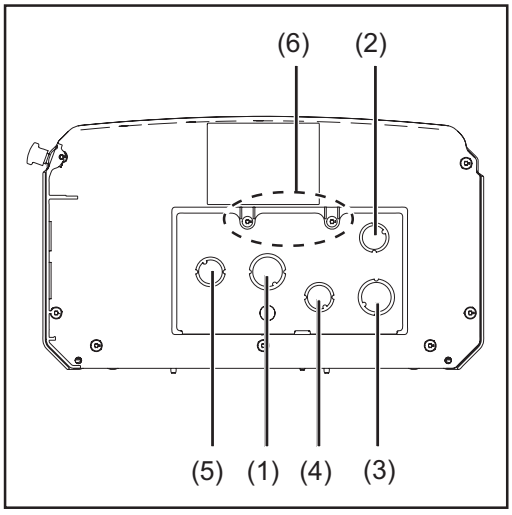
Knockouts on the left-hand side



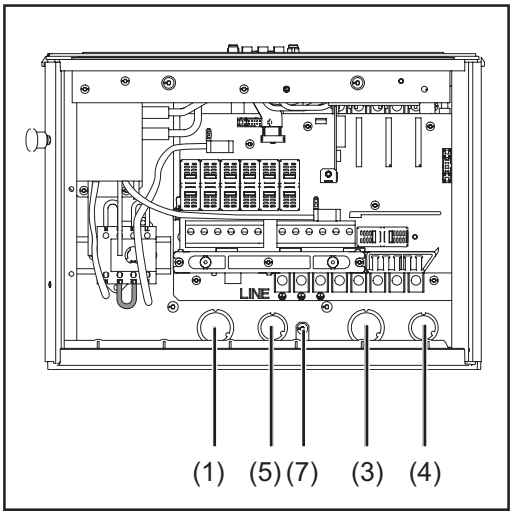

Knockouts on the right-hand side




Knockouts on the underside




Knockouts on the backside




| Item | Description |
|---|---|
| (1) | Knockout, diameter 3/4 in. / 1 in.<br>e.g., for DC wire, surge arrester |
| (2) | Knockout, diameter 1/2 in. / 3/4 in.<br>only for data wires |
| (3) | Knockout, diameter 3/4 in. / 1 in.<br>e.g., for AC wire, surge arrester |
| (4) | Knockout, diameter 1/2 in. / 3/4 in.<br>e.g., for AC wire, surge arrester |

| Item | Description |
|---|---|
| (5) | Knockout, diameter 1/2 in. / 3/4 in.<br>e.g., for DC wire, surge arrester |
| (6) | FTX 25 fixing screws |
| (7) | FTX 25 fixing screw |

**NOTE!** When using back wire inputs:
- seal enclosure as per NEMA 3R before outside operation

**NOTE!**
- The larger knockouts should only be removed from the outside in.
- The smaller knockouts should be removed from the inside out.
- Only remove the number of knockouts required for the available wire inputs.

**CAUTION!** Danger of damaging the plastic base when removing the knockouts on the bottom.
- Before removing, remove the 3 fixing screws (6) and (7)
- Remove the metal insert from the plastic base
- Remove the required knockouts
- Replace the metal insert into the plastic base
- Secure the metal insert using the 3 fixing screws (6) and (7)

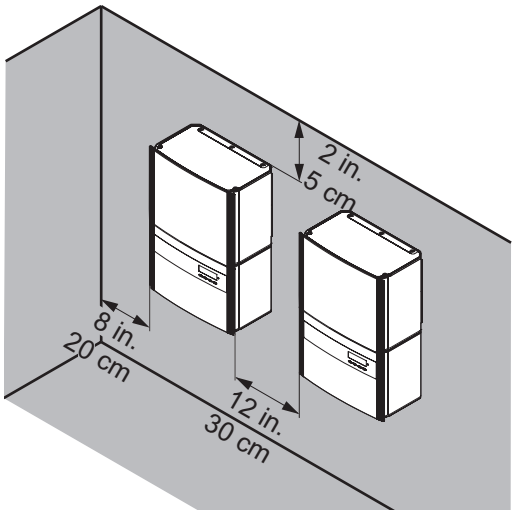
# Choosing the Location

**Choosing the location in general**

Please note the following criteria when choosing a location for the inverter:

| |
|---|
| Only vertical installation |
| Max. ambient temperatures: -4 °F / +122 °F (-20 °C / +50 °C) |
| Relative humidity: 0 - 95 % |
| For use at altitudes above sea level: up to 6561 ft. (2000 m) |

- Keep a minimum distance of 8 in. (20 cm) between each inverter or anything to the right or left of the inverters such as walls or DC and AC disconnects.
  For optimal airflow and cooling efficiency in hot climates, the manufacturer recommend a distance of 10 - 12 in. (25 - 30 cm).
- When installing more than one inverter, keep a distance of 12 in. (30 cm) between each inverter.




| |
|---|
| Keep a minimum distance under the inverter corresponding to the ‘NEC 110.26 for code compliant disconnect location.’ |
| The air flow direction within the inverter is from right to left (cold air intake on right, hot air exit on left). |
| When installing the inverter in a switch panel cabinet (or similar closed environment), it is necessary to make sure that the hot air that develops will be discharged by forced ventilation. |
| The inverter is designed for installation both indoors and outdoors. |

**Choosing a Location for Inside Installation**

| |
|---|
| During certain operation phases the inverter may produce a slight noise. For this reason it should not be installed in an occupied living area. |

Do not install the inverter in:

- areas with large amounts of dust
- areas with large amounts of conducting dust particles (e.g., iron filings)
- areas with corrosive gases, acids or salts
- areas where there is an increased risk of accidents, e.g., from farm animals (horses, cattle, sheep, pigs, etc.)
- stables or adjoining areas
- storage areas for hay, straw, chaff, animal feed, fertilizers, etc.
- storage or processing areas for fruit, vegetables or winegrowing products
- areas used in the preparation of grain, green fodder or animal feeds
- greenhouses

**Choosing a location for outdoor installation**

NEMA 3R protection means that the inverter is not susceptible to water spray from any direction.
However, the manufacturer recommends, if possible, that the inverter not be exposed to direct moisture or to a direct water jet (e.g., from sprinklers).

In order to protect the display, the inverter should not be exposed to direct sunlight. Ideally, the inverter should be installed in a protected location, e.g., near the solar modules or under a roof overhang.

# Fronius IG Plus Installation

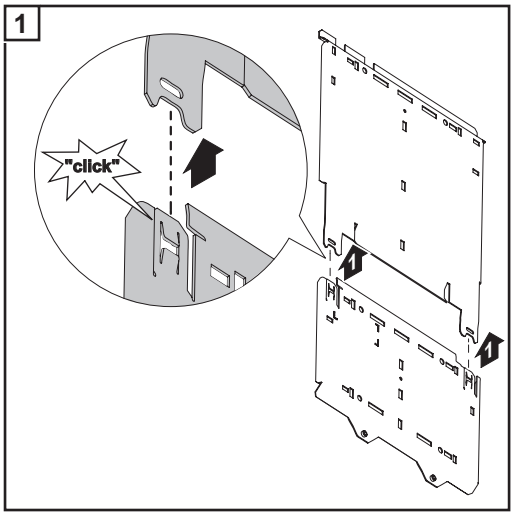
**General**

**IMPORTANT!** Depending on the surface, different dowels and screws may be required for installing the wall bracket. These dowels and screws are not part of the scope of delivery for the inverter. The installer is responsible for selecting the proper dowels and screws.

**NOTE!** The inverter is designed only for a vertical installation position.

**Assembling the wall bracket**

Only for Fronius IG Plus 10.0-1 / 11.4-1 / 11.4-3 / 12.0-3:




Because of logistical limits, the wall bracket for these inverters is divided into two parts.

- Assemble wall bracket as per step 1

**Recommended screws for wall bracket assembly**

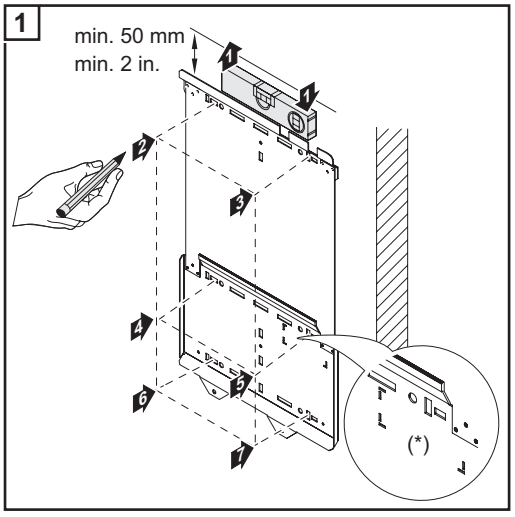
In most cases, you should use 1/4 in. or 5/16 in. stainless steel or aluminum screws capable of supporting 31 lbs. (Fronius IG Plus 3.0-1 / 3.8-1), 57 lbs. (Fronius IG Plus 5.0-1 / 6.0-1 / 7.5-1), or 82 lbs. (Fronius IG Plus 10.0-1 / 11.4-3 / 12.0-3) of inverter weight.

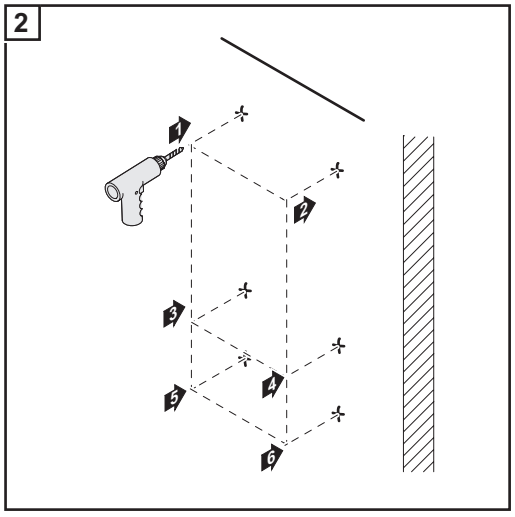
**Attaching the wall bracket - mounting height**

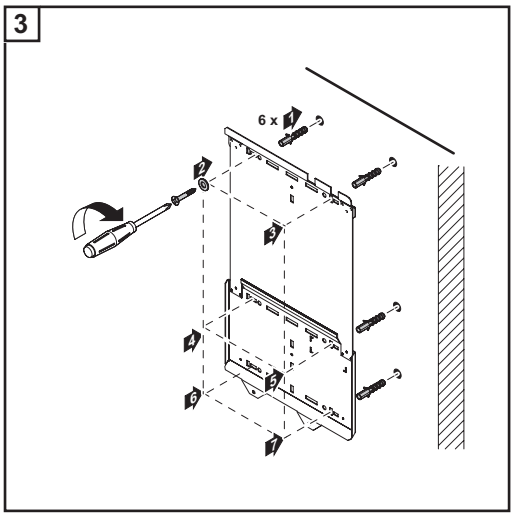
**IMPORTANT!** The NEC requires that the DC disconnect be mounted between 3 ft. and 6 1/2 ft. from the ground if it is to be used as a code-compliant disconnect. The DC disconnect is in the lower left part of the inverter. Also, the cut out segment marked (*) in the following drawings represents the placement of the inverter display. Use this to ensure a comfortable display height for easy reading.

**Attaching the wall bracket to a concrete or brick wall**

**IMPORTANT!** The cut out segment marked (*) represents the placement of the inverter display. Use this to ensure a comfortable display height for easy reading.

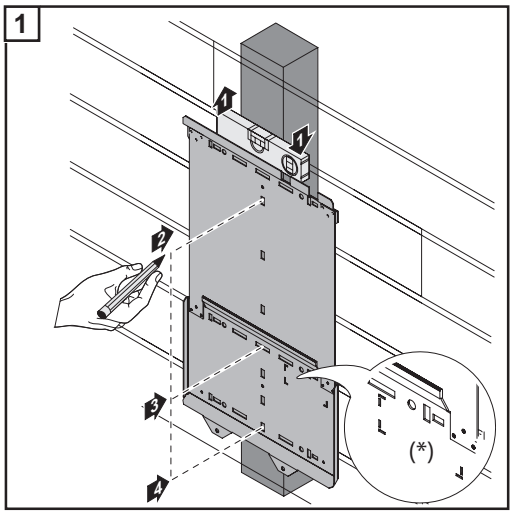


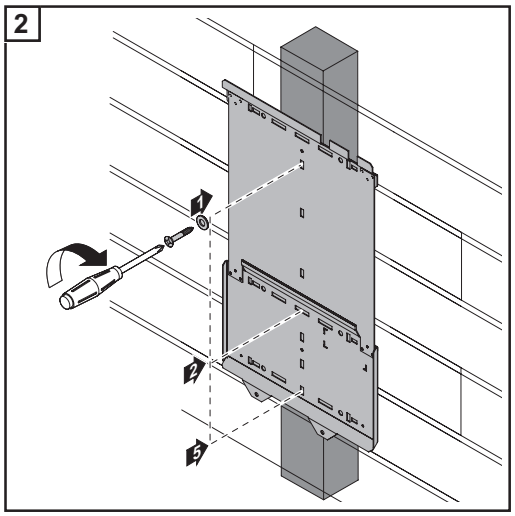




**Attaching the wall bracket to a wooden wall**

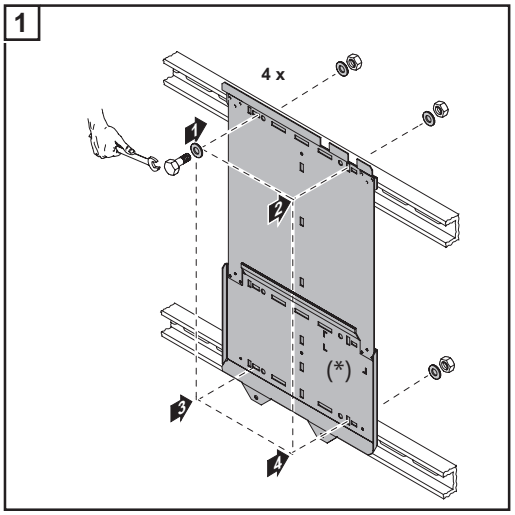
**IMPORTANT!** The cut out segment marked (*) represents the placement of the inverter display. Use this to ensure a comfortable display height for easy reading.



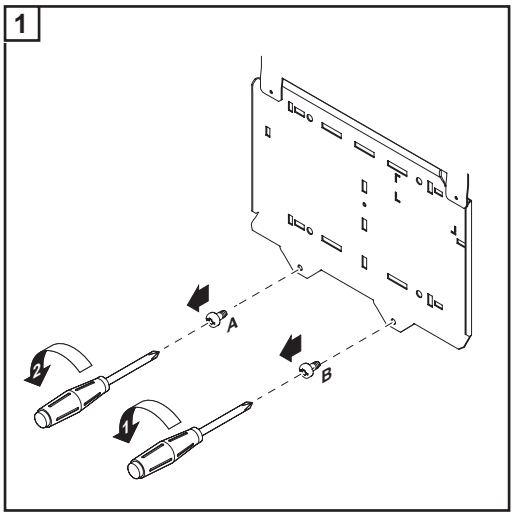
**Attaching the wall bracket to a metal carrier**

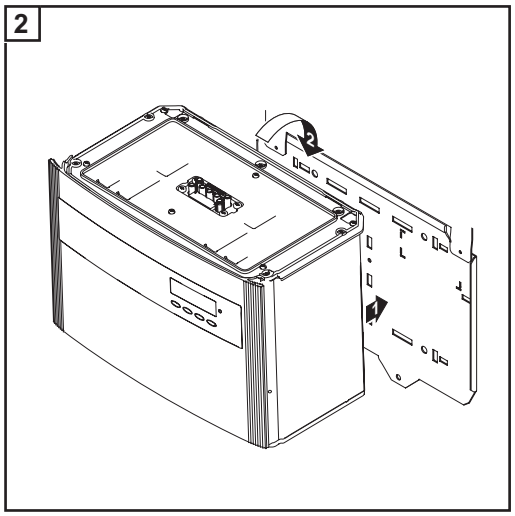
**IMPORTANT!** The cut out segment marked (*) represents the placement of the inverter display. Use this to ensure a comfortable display height for easy reading.

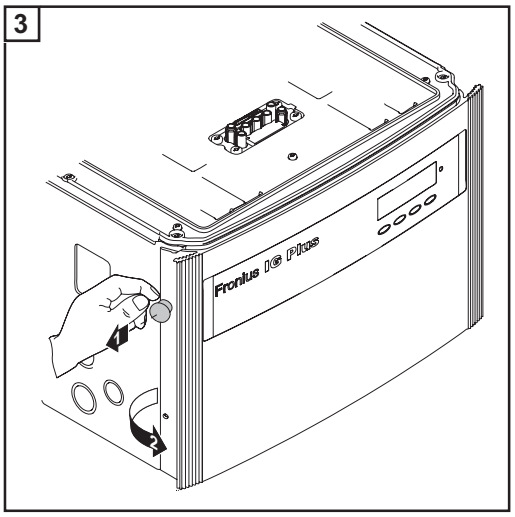


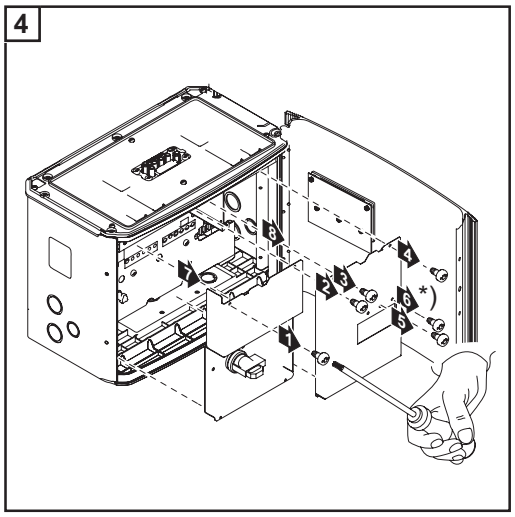

**NOTE!** When installing using a metal carrier, the inverter should not be exposed to rainwater or water spray at the back. Ensure proper rainwater or spray water protection.

**Fronius IG Plus installation**



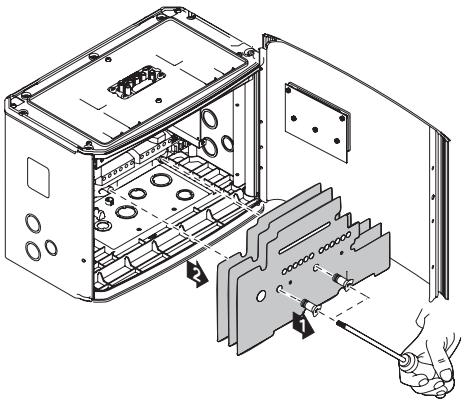




*) Remove all fixing screws from any available option cards.

**CAUTION!** Danger of injury by falling equipment. Attach the connection area of the inverter to the wall bracket using the 2 screws removed from the wall bracket in step 1.

5



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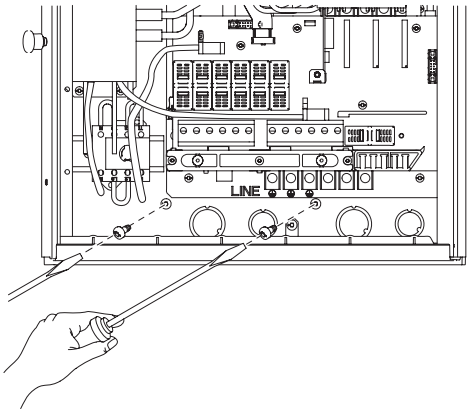
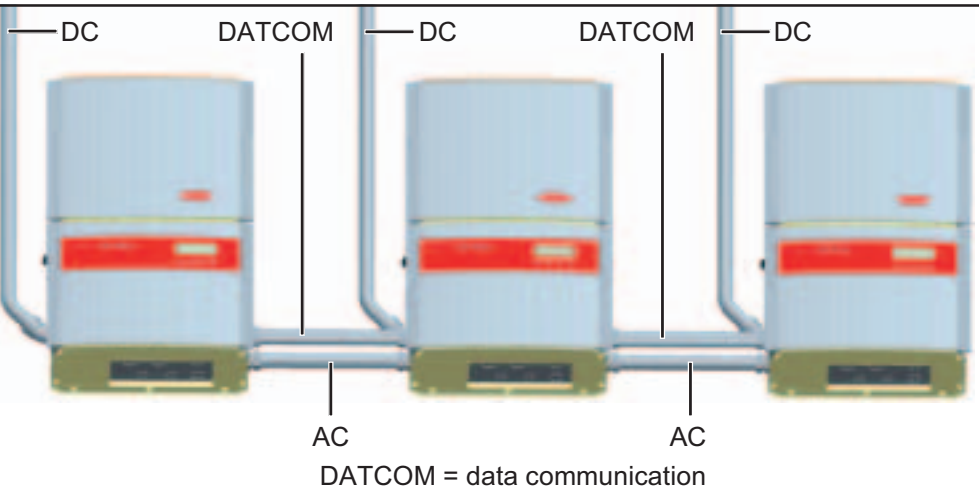



**Installation of several inverters**

Several inverters can be easily installed and connected next to each other using the side knockouts on the inverter, e.g.:

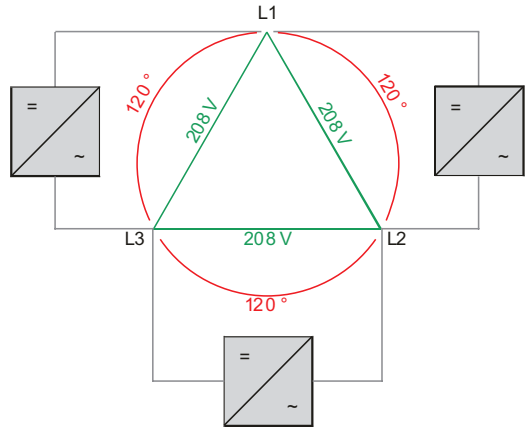
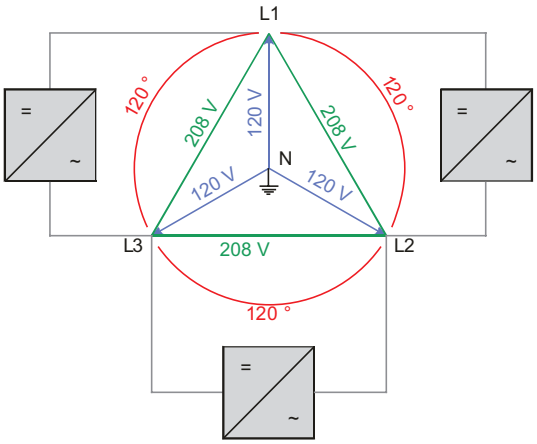
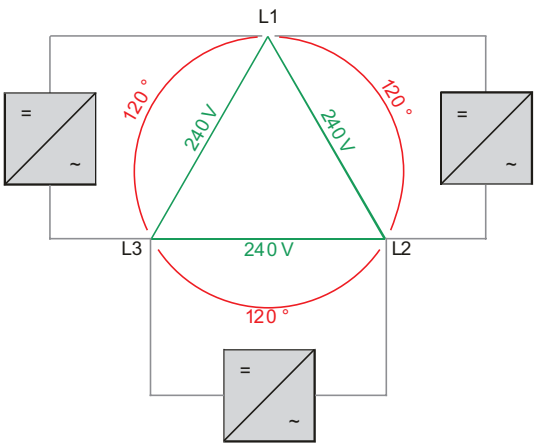


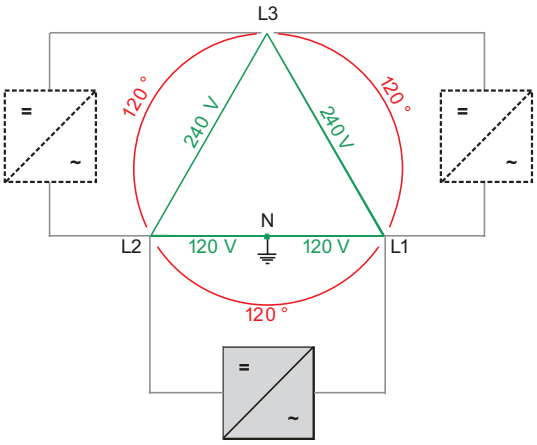
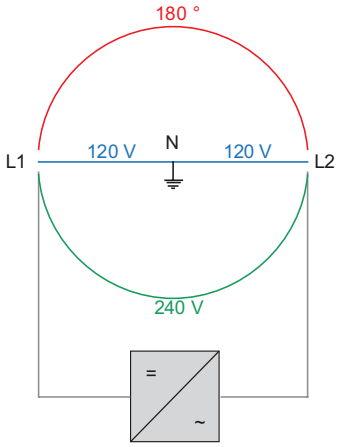
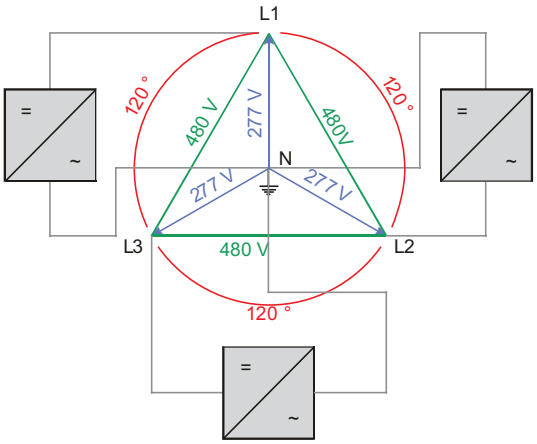

**NOTE!** All electrical installations must be carried out in accordance with the National Electrical Code, ANSI/NFPA 70, and any other codes and regulations applicable to the installation site.
For installations in Canada, the installations must be done in accordance with applicable Canadian standards.

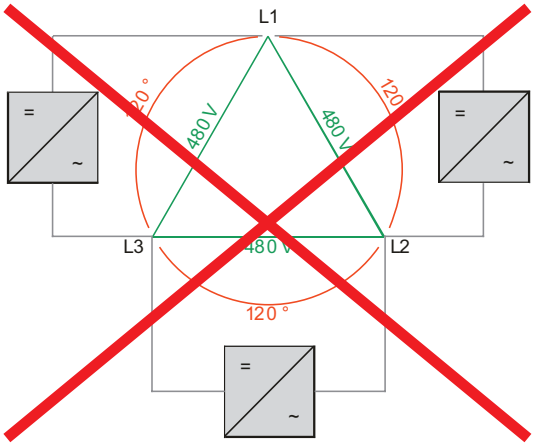
# Connecting the Fronius IG Plus to the Public Grid (AC)

**Overview of available grids**

Inverters can be connected to the following grids:

| Grid | Inverter |
|---|---|
| 208 V Delta<br>  | Fronius IG Plus 3.0-1<br>Fronius IG Plus 3.8-1<br>Fronius IG Plus 5.0-1<br>Fronius IG Plus 6.0-1<br>Fronius IG Plus 7.5-1<br>Fronius IG Plus 10.0-1<br>Fronius IG Plus 11.4-1<br>Fronius IG Plus 11.4-3 |
| 208 V Delta: 120 V WYE<br>  | Fronius IG Plus 3.0-1<br>Fronius IG Plus 3.8-1<br>Fronius IG Plus 5.0-1<br>Fronius IG Plus 6.0-1<br>Fronius IG Plus 7.5-1<br>Fronius IG Plus 10.0-1<br>Fronius IG Plus 11.4-1<br>Fronius IG Plus 11.4-3 |
| 240 V Delta<br>  | Fronius IG Plus 3.0-1<br>Fronius IG Plus 3.8-1<br>Fronius IG Plus 5.0-1<br>Fronius IG Plus 6.0-1<br>Fronius IG Plus 7.5-1<br>Fronius IG Plus 10.0-1<br>Fronius IG Plus 11.4-1<br>Fronius IG Plus 11.4-3 |

| Grid | Inverter |
|---|---|
| 240 V: 120 V Stinger<br>  | Fronius IG Plus 3.0-1<br>Fronius IG Plus 3.8-1<br>Fronius IG Plus 5.0-1<br>Fronius IG Plus 6.0-1<br>Fronius IG Plus 7.5-1<br>Fronius IG Plus 10.0-1<br>Fronius IG Plus 11.4-1 |
| 240 V: 120 V Split phase<br>  | Fronius IG Plus 3.0-1<br>Fronius IG Plus 3.8-1<br>Fronius IG Plus 5.0-1<br>Fronius IG Plus 6.0-1<br>Fronius IG Plus 7.5-1<br>Fronius IG Plus 10.0-1<br>Fronius IG Plus 11.4-1 |
| 480 V Delta: 277 V WYE<br>  | Fronius IG Plus 3.0-1<br>Fronius IG Plus 3.8-1<br>Fronius IG Plus 5.0-1<br>Fronius IG Plus 6.0-1<br>Fronius IG Plus 7.5-1<br>Fronius IG Plus 10.0-1<br>Fronius IG Plus 11.4-1<br><br>Fronius IG Plus 12.0-3 |

| Grid | Inverter |
|---|---|
| 480 V Delta<br>  | **NOTE!** Do not connect Fronius IG Plus inverters to the 480 V Delta grid. |

**Monitoring the Grid**

**IMPORTANT!** The resistance in the leads to the AC-side connection terminals must be as low as possible for optimal functioning of grid monitoring.

**Systems with more than one inverter**

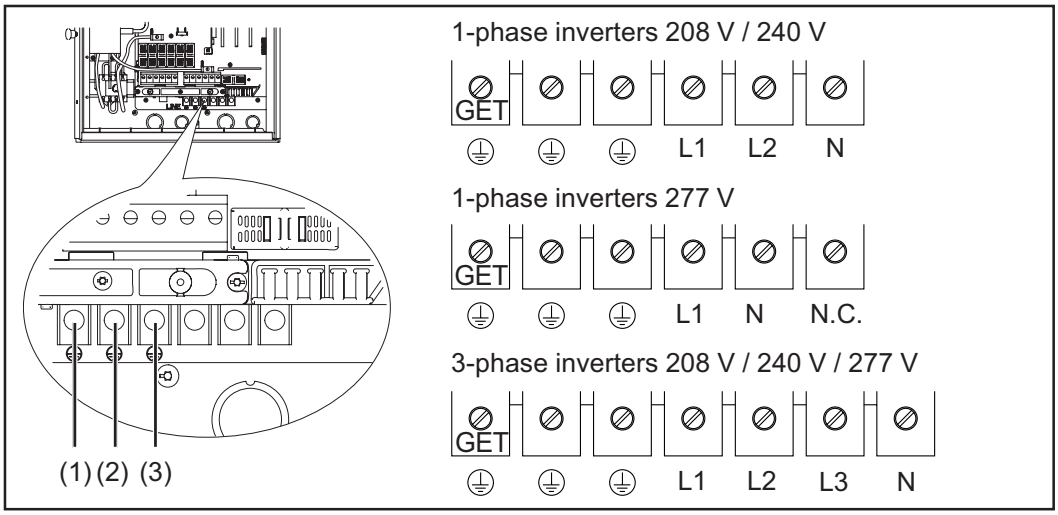
For larger photovoltaic systems, it is possible to connect several inverters in parallel without any problems. To ensure symmetrical feeding, connect the inverters uniformly to all 3 phases.

**NOTE!** The inverter is designed to be connected to three-phase systems. Utilities generally allow up to 6 kVA of unbalance, but check with your utility and try to balance the installation.
The connection to the grid should be done in the following way:

208 V / 240 V:
- Connect Fronius IG Plus No. 1, No. 4, No. 7, ... to L1 and L2
- Connect Fronius IG Plus No. 2, No. 5, No. 8, ... to L2 and L3
- Connect Fronius IG Plus No. 3, No. 6, No. 9, ... to L1 and L3

277 V:
- Connect Fronius IG Plus No. 1, No. 4, No. 7, ... to L1 and N
- Connect Fronius IG Plus No. 2, No. 5, No. 8, ... to L2 and N
- Connect Fronius IG Plus No. 3, No. 6, No. 9, ... to L3 and N

**AC-side terminals and grounding terminals**




The terminals are designed for the following terminal connections:

Grounding terminals:

| | |
|---|---|
| (1) | Grounding Electrode Terminal (GET)<br>A grounding electrode terminal may be required depending on local regulations. |
| (2) | Grounding of photovoltaic components (e.g., solar module frames)<br>The ground for photovoltaic components such as solar module frames must be connected at the grounding terminals. The size of the wire usually corresponds to the largest wire in the DC system. |
| (3) | Grid grounding / Grounding conductor<br>The Fronius IG Plus must be connected via the grounding terminal to the AC grid grounding. |

**NOTE!**

- Use copper wires for all grounding cables
- Use only solid or stranded wire. Do not use fine stranded wire.
- See NEC section 250 for correct grounding.

AC-side terminals:

| | |
|---|---|
| L1 | = Phase conductor L1 |
| L2 | = Phase conductor L2 |
| L3 | = Phase conductor L3 |
| N | = Neutral conductor N |

**NOTE!** The neutral conductor is not bonded to ground internally.

| | |
|---|---|
| NC | = Not connected |

Max. wire cross section AWG 4

**Cross section of AC wires**

**WARNING!** An electric shock can be fatal. Inadequately sized electrical components can cause serious injuries to persons and damage to (or loss of) property.

- All electrical installations must be carried out in accordance with the National Electrical Code, ANSI/NFPA 70, and any other codes and regulations applicable to the installation site.
- For installations in Canada, the installations must be done in accordance with applicable Canadian standards.
- Use minimum AWG 14 to maximum AWG 4, min. 167°F (75°C), copper wire for all AC wiring connections to the Fronius IG Plus. Voltage drop and other considerations may dictate larger size wires be used.
- Use only solid or stranded wire. Do not use fine stranded wire.

Minimum cross section of AC wires (for an ambient temperature of 122 °F / 50 °C):

| Fronius IG Plus | AC wire 208 V | AC wire 240 V | AC wire 277 V |
|---|---|---|---|
| 3.0-1 | AWG 12 | AWG 14 | AWG 14 |
| 3.8-1 | AWG 12 | AWG 12 | AWG 12 |
| 5.0-1 | AWG 8 | AWG 10 | AWG 12 |
| 6.0-1 | AWG 8 | AWG 8 | AWG 10 |
| 7.5-1 | AWG 6 | AWG 6 | AWG 8 |
| 10.0-1 | AWG 4 | AWG 4 | AWG 6 |
| 11.4-1 | AWG 4 | AWG 4 | AWG 4 |
| 11.4-3 | AWG 8 | AWG 8 | - |
| 12.0-3 | - | - | AWG 12 |

**Safety**

Only an authorized electrician is permitted to connect this inverter to the public grid.

**WARNING!** An electric shock can be fatal. Danger from grid voltage and DC voltage from solar modules.

- The connection area should only be opened by a licensed electrician.
- The separate power stage set area should only be disconnected from the connection area after first being disconnected from the grid power.

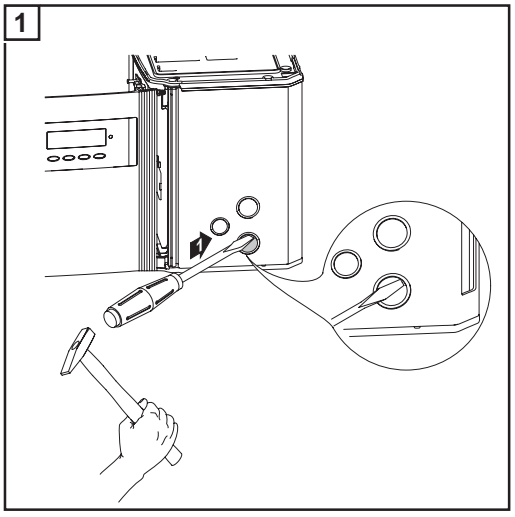
Never work with live wires! Prior to all connection work, make sure that the AC and DC wires are not charged.

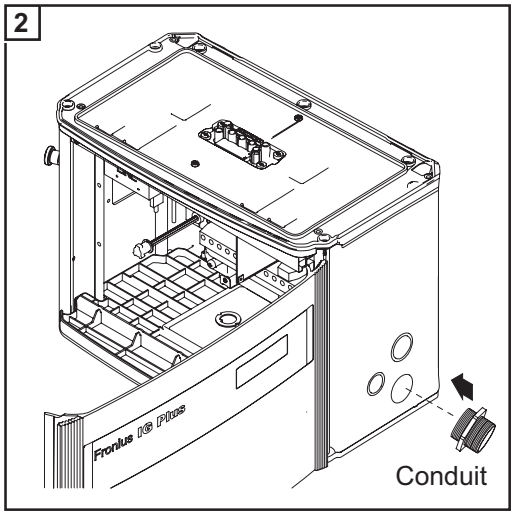
**CAUTION!** Danger of damaging the inverter due to an overload of the grid neutral conductor.

- Do not connect 2-phase and 3-phase devices to one phase
- Never operate multiphase devices in one phase

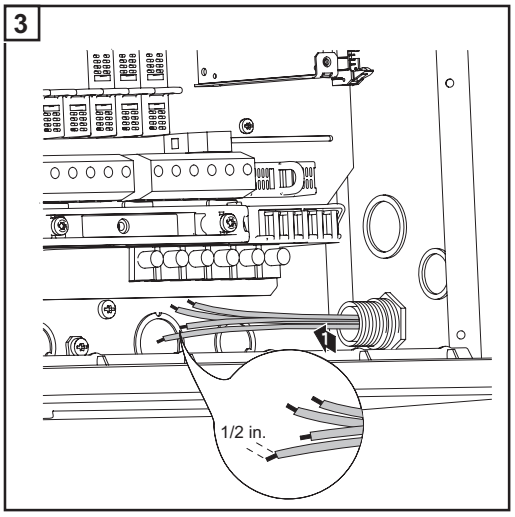
**CAUTION!** Danger of damaging the inverter from improperly connected terminals. Improperly connected terminals can cause thermal damage to the inverter and may cause a fire. When connecting the AC and DC cables, make sure that all terminals are tightened securely using the proper torque.

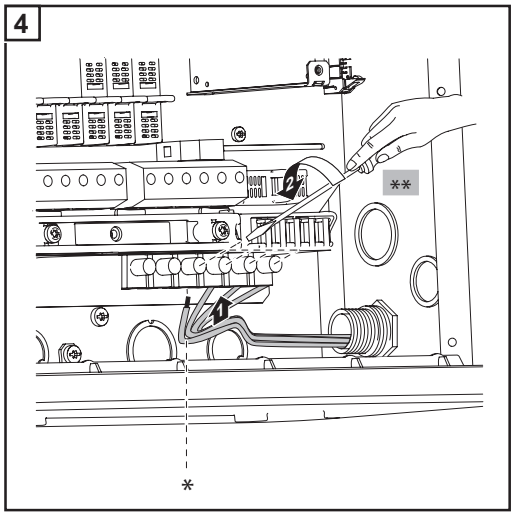
**Connecting the Fronius IG Plus to the public grid (AC)**




**NOTE!** Use only water tight conduit fittings and conduits. Conduit fittings and conduits are not part of the scope of supply for the inverter.



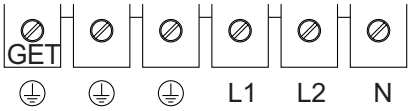




* Connect grid grounding / grounding conductor to the right grounding terminal

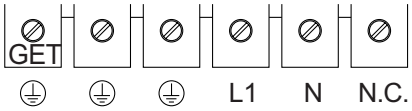
** Tightening torque:
Stranded wires 1.25 ft. lb.
Solid wires 0.81 ft. lb.

Connect the AC wires to the AC-side terminals depending on the grid and phase quantity of the inverter:

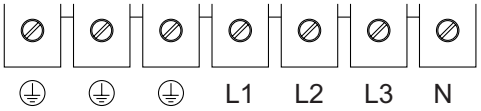
1 phase - 208 V / 240 V




1 phase - 277 V




3 phases - 208 V / 240 V / 277 V



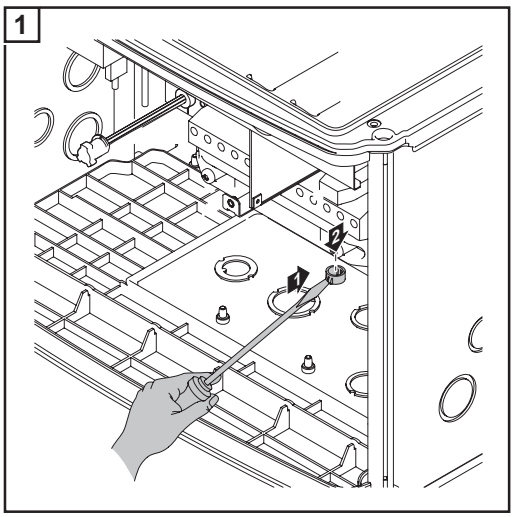

GET:
Grounding electrode terminal

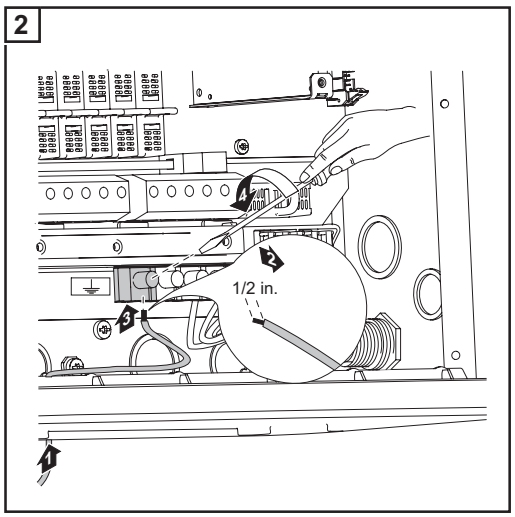
N.C.:
Not used

**NOTE!** Form a min. 4 in. wire loop using all wires.

**Connecting grounding electrode wire**

If the photovoltaic system requires a grounding electrode, it should be connected as follows:




Tightening torque:
Stranded wires 1.25 ft. lb.
Solid wires 0.81 ft. lb.

**NOTE!** Form a min. 4 in. wire loop using all wires.

**Recommendation for the AC-side overcurrent protection**

**NOTE!** To reduce the risk of fire, connect only to a circuit provided with branch circuit overcurrent protection in accordance with the National Electrical Code, ANSI / NFPA 70, at a MAXIMUM of:

| **Fronius IG Plus** | **Overcurrent protection** | | |
|---|---|---|---|
| | **208 V** | **240 V** | **277 V** |
| 3.0-1 | 20 A | 20 A | 15 A |
| 3.8-1 | 25 A | 20 A | 20 A |
| 5.0-1 | 30 A | 30 A | 25 A |
| 6.0-1 | 40 A | 35 A | 30 A |
| 7.5-1 | 45 A | 40 A | 35 A |
| 10.0-1 | 60 A | 60 A | 45 A |
| 11.4-1 | 70 A | 60 A | 60 A |
| 11.4-3 | 40 A | 35 A | - |
| 12.0-3 | - | - | 20 A |

**Additional external AC and/or DC disconnect**

Depending on the installation, an additional external AC and/or DC disconnect may be required if the inverter is installed in a location not easily accessible to utility or fire personnel. Contact your local authorities for additional information.

# Connecting Solar Module Strings to the Fronius IG Plus (DC)

USA

**General information about solar modules**

In order to select suitable solar modules and get the most efficient use out of the inverter, please note the following points:

- The open circuit voltage of the solar modules increases as the temperature decreases (assuming constant irradiance). The open circuit voltage should never rise above 600 V at a temperature of 14 °F (-10 °C) and an irradiance of 1000 W/m².

  If the open circuit voltage exceeds 600 volts, the inverter may be damaged, and all warranty rights will become null and void.
- More exact data for sizing the solar array for the particular location can be obtained using calculation tools such as the Fronius Configuration Tool (available at http://www.fronius-usa.com).
- See NEC table 690.7 for the appropriate code-related voltage adjustment factor for crystalline silicon modules, or use the manufacturer's specified voltage coefficient.

**Safety**

**WARNING!** An electric shock can be fatal. Danger due to grid voltage and DC voltage from solar modules.

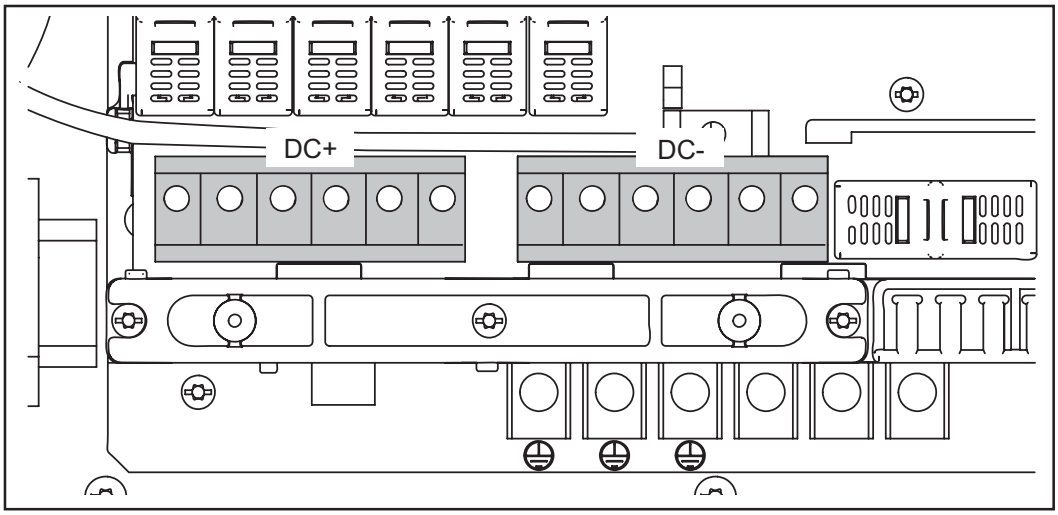
- The connection area should only be opened by a licensed electrician.
- The separate power stage set area should only be disconnected from the connection area after first being disconnected from the grid power.
- The separate power stage set area should only be opened by Fronius-trained service personnel.

Never work with live wires! Prior to all connection work, make sure that the AC and DC wires are not charged.

The DC main switch is only used to switch off power to the power stage set. When the DC main switch is turned off, the connection area is still energized.

**CAUTION!** Danger of damaging the inverter from improperly connected terminals. Improperly connected terminals can cause thermal damage to the inverter and may cause a fire. When connecting the AC and DC cables, make sure that all terminals are tightened securely using the proper torque.

**DC terminals**




**Polarity Reversal of Solar Module Strings**

The inverter comes standard with 6 metal bolts in fuse holders in the connection area. The inverter is designed so that a reverse polarity of all solar module strings will not cause any damage to the inverter when these metal bolts are used.

**CAUTION!** However, there is a risk of damage and fire to the inverter due to reverse polarity of a solar module string when the metal bolts are used.
The reverse polarity of a solar module string can cause an unacceptable thermal load, which can lead to an inverter fire.
When using metal bolts, always make sure that the polarity is correct before connecting the individual solar module strings.

If string fuses are used instead of the metal bolts, the reverse polarity of an individual solar module string can cause damage to the inverter and cause an inverter fire.

**CAUTION!** Risk of damage and fire to inverter due to reverse polarity of solar module strings when using string fuses.
Reverse polarity of solar module strings can lead to an unacceptable overload to a string fuse being used. This can cause a strong arc, which can lead to an inverter fire.
When using string fuses, always make sure that the polarity is correct before connecting the individual solar module strings.

**Overview**

'Connecting solar module strings to the Fronius IG Plus (DC)' includes the following sections:

- Connecting solar module strings
- Criteria for the proper selection of string fuses

- Connecting combined solar module strings using connecting distributors

- Solar module ground at positive pole: Connecting solar module strings
- Criteria for the proper selection of string fuses

- Solar module ground at positive pole: Connecting combined solar module strings using connecting distributors

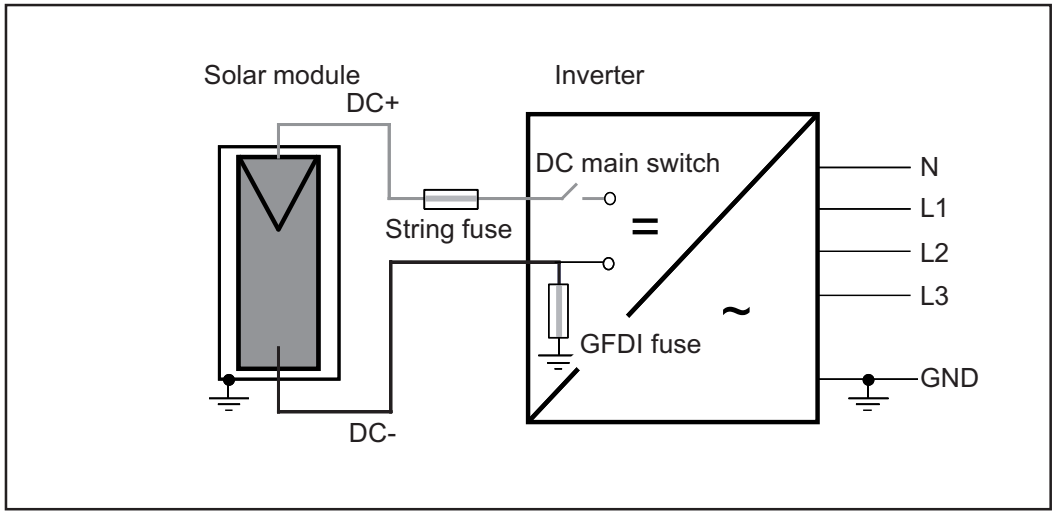
# Connecting solar module strings



**Solar module ground**

The inverter is designed for a solar module ground at the negative pole. The solar module ground is carried out via a fuse in the inverter.

Solar module ground at negative pole with fuse:




**WARNING!** An electric shock can be fatal. Normally grounded conductors may be ungrounded and energized when a ground fault is indicated. The ground fault has to be repaired before operation is resumed.

**NOTE!** Do not connect the ground to the negative DC line at any point! This is already done within the inverter. If negative DC lines are connected to the DC terminals or prior to this to the ground, this will circumvent the GFDI protection system, preventing your inverter from properly detecting a fault current.
In addition, turning the DC disconnect to the OFF/open circuit condition will not disconnect the array from ground, as it only disconnects the DC positive.

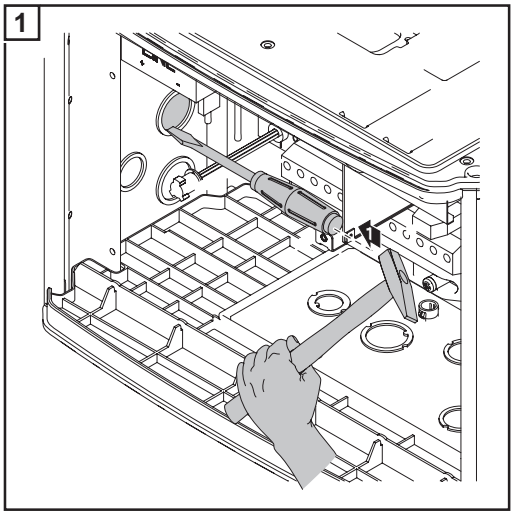
**Wire cross section of solar module strings**

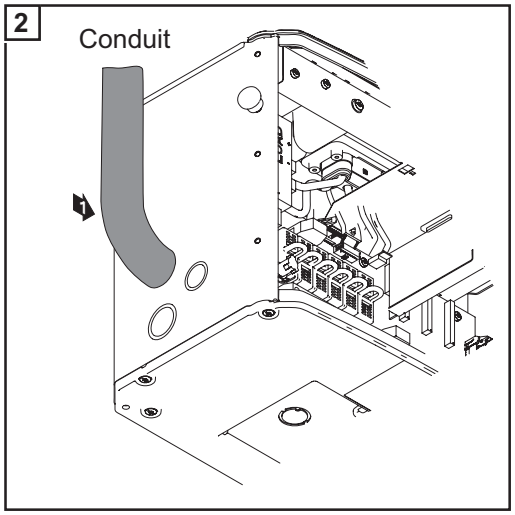
**WARNING!** An electric shock can be fatal. Inadequately sized electrical components can cause serious injuries to persons and damage to (or loss of) property.

- All electrical installations must be carried out in accordance with the National Electrical Code, ANSI/NFPA 70, and any other codes and regulations applicable to the installation site.
- For installations in Canada, the installations must be done in accordance with applicable Canadian standards.
- Use minimum AWG 14, min. 167 °F (75 °C), copper wire for all grounding wires (see NEC table 250.122).
- Use minimum AWG 14 to maximum AWG 6, min. 167°F (75°C), copper wire for all DC wiring connections to the inverter. Voltage drop and other considerations may dictate larger size wires be used.
- Use only solid or stranded wire. Do not use fine stranded wire.

**NOTE!** To ensure an effective strain relief device for solar module strings, only use cable cross sections of the same size.

**Connecting solar module strings**

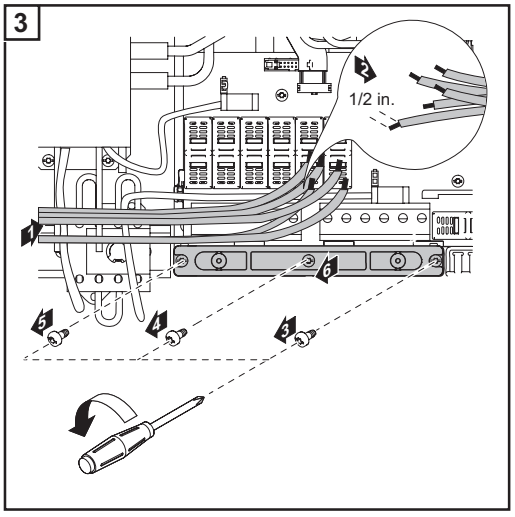


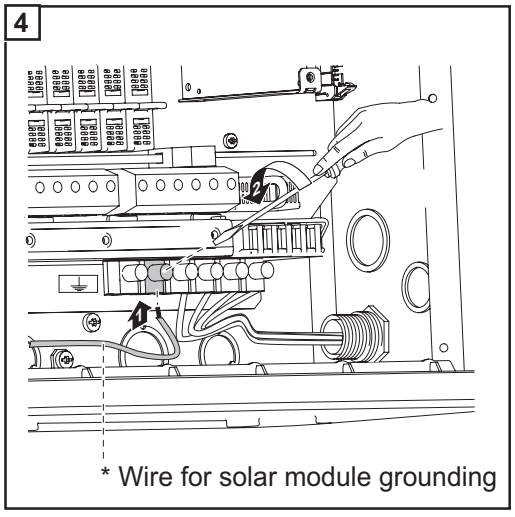




**NOTE!** Use only water tight conduit fittings and conduits. Conduit fittings and conduits are not part of the scope of supply for the inverter.

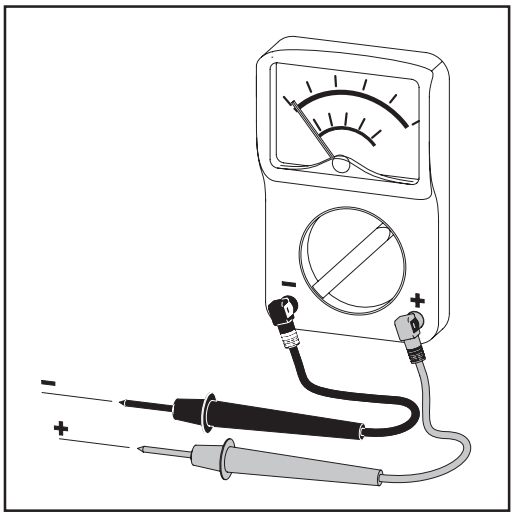
**CAUTION!** Danger of damaging the inverter by overload.

- Only connect a maximum of 20 A to an individual DC terminal.
- Connect the DC+ and DC- cables to the correct DC+ and DC- terminals on the inverter.



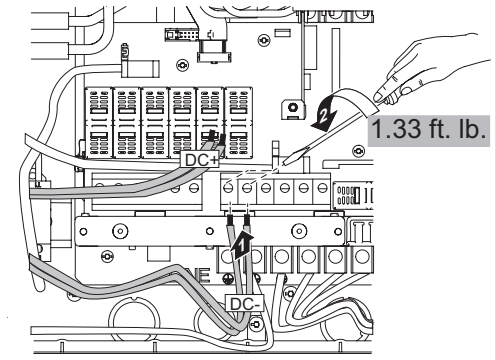

Tightening torque:
Stranded wires 1.25 ft. lb.
Solid wires 0.81 ft. lb.




**NOTE!** Connecting the DC wiring with the wrong polarity may cause damage to the inverter. Check both the polarity and the open circuit voltage.

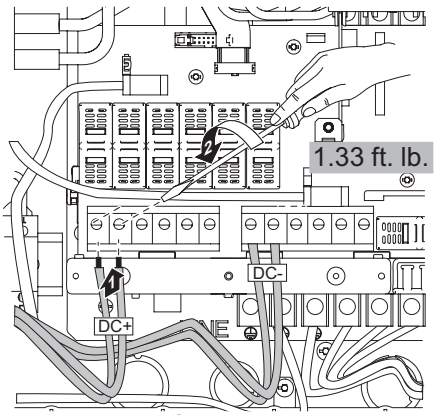
The DC Voltage must not exceed 600 V, regardless of temperature.

5




Tightening torque for solid and stranded wires

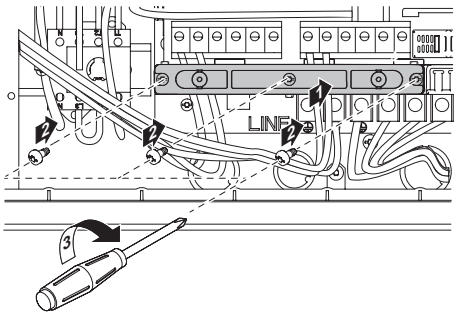
6




Tightening torque for solid and stranded wires

**NOTE!** Form a min. 4 in. wire loop using all wires.

7

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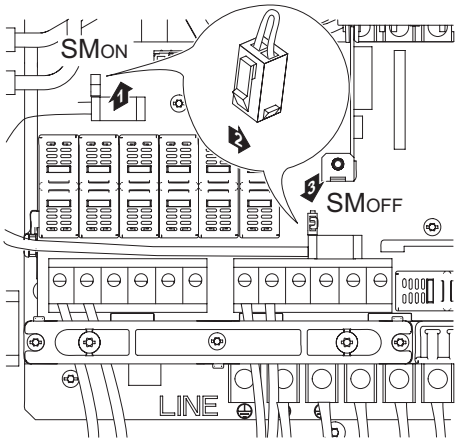
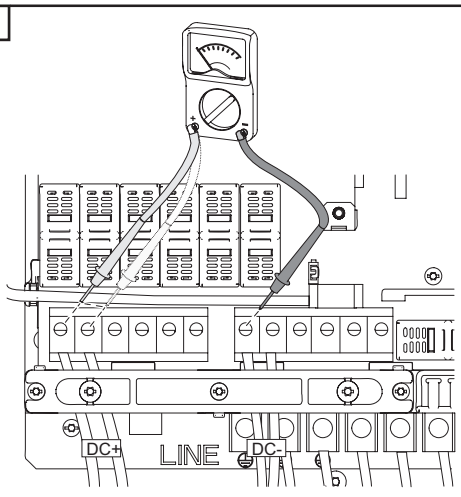



**IMPORTANT!**

- Set the jumper from the '$SM_{ON}$' position to the '$SM_{OFF}$' position for correct measurement results
- Check the polarity and voltage of the solar module strings: the voltage should be a max. of 600 V, the difference between the individual solar module strings should be a max. of 10 V.

9

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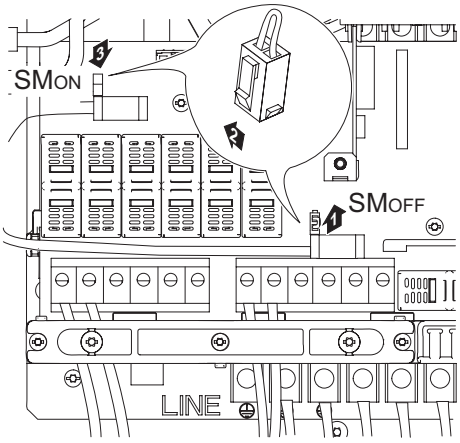


**Inserting string fuses**

**IMPORTANT** The inverter is shipped with conductive slugs in the fuse holders. Series fusing may be required depending on the type of solar module used in the system.
See NEC 690.9.

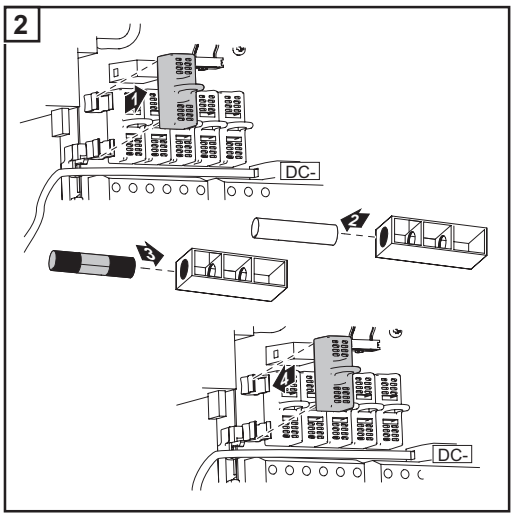
1 Select string fuses according to the information from the solar module manufacturer or as per 'Criteria for the proper selection of string fuses' (max. 20 A per individual DC terminal)

**IMPORTANT!**

- Follow all solar module safety instructions
- Follow all solar module manufacturer requirements

**WARNING!** An electric shock can be fatal. Danger from DC voltage from solar modules. Fuse covers are for installation purposes only. They offer no protection against contact.

2




**NOTE!**

- Insert fuses only with a fuse cover in the respective fuse holder
- Do not operate the inverter without fuse covers

# Criteria for the Proper Selection of String Fuses

**DC disconnect requirements**

NEC 690.15-18 allows the use of fuse holders as a suitable means of disconnecting PV arrays for servicing.
Additional DC disconnects external to the inverter may be required by the local authority having jurisdiction.

**General**

The use of string fuses in the inverter also adds fuse protection to the solar modules.
A crucial factor for the fuse protection of solar modules is the maximum short circuit current $I_{sc}$ of the respective solar module.

**Criteria for the proper selection of string fuses**

The following criteria must be fulfilled for each solar module string when using fuse protection:

- $I_N > 1.56 \times I_{SC}$
- $I_N < 2.00 \times I_{SC}$
- $V_N >/= 600$ V DC
- Fuse dimensions: Diameter 0.41 x 1.38 - 1.50 in. (10.3 x 35 -38 mm)

$I_N$ Nominal current rating of fuse

$I_{SC}$ Short circuit current for standard test conditions (STC) according to solar module data sheet

$V_N$ Nominal voltage rating of fuse

**NOTE!** The string fuse size must not be greater than the maximum fuse size rating of the PV module as provided on the PV module manufacturers data sheet. If no maximum fuse size is indicated, please contact the PV module manufacturer.

**Effects of Using Underrated Fuses**

In underrated fuses, the nominal current value is less than the short circuit current of the solar module.
Effect:
The fuse may trip in intensive lighting conditions.

**Fuse Recommendations**

**NOTE!** Only select fuses suitable for a voltage of 600 V DC.

You should only use the following fuses, which have been tested by Fronius, to ensure problem-free fuse protection:

- Littelfuse KLKD fuses
- Cooper Bussmann PV fuses

Fronius shall not be liable for any damage or other incidents resulting from the use of other fuses. In addition, all warranty claims are forfeited.

**Application example**

Example: Maximum short circuit current ($I_{SC}$) of the solar module = 5.75 A

According to the criteria for selecting the correct fuse, the fuse must have a nominal current greater than 1.56 times the short circuit current:
5.75 A x 1.56 = 8.97 A

The fuse that should be selected according to the ‘Fuses’ table:
KLK D 9 with 9.0 A and 600 V AC / DC

**Fuses**

| Nominal current value | Fuse | Nominal current value | Fuse |
|---|---|---|---|
| 1.0 A | KLK D 1 | 6.0 A | KLK D 6 |
| 1.5 A | KLK D 1 1/2 | 7.0 A | KLK D 7 |
| 2.0 A | KLK D 2 | 8.0 A | KLK D 8 |
| 2.5 A | KLK D 2 1/2 | 9.0 A | KLK D 9 |
| 3.0 A | KLK D 3 | 10.0 A | KLK D 10 |
| 3.5 A | KLK D 3 1/2 | 12.0 A | KLK D 12 |
| 4.0 A | KLK D 4 | 15.0 A | KLK D 15 |
| 5.0 A | KLK D 5 | 20.0 A | KLK D 20 |

"Fuses" Table: Excerpt of Suitable Fuses, e.g., Littelfuse Fuses

# Connecting combined solar module strings using connecting distributors

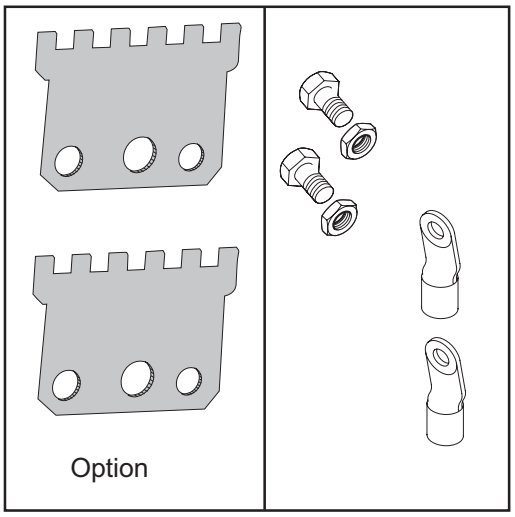
**General**

If several solar module strings are combined outside of the inverter into one solar module string, the current of the solar module string can be higher than the current permitted for a DC terminal (20 A).

In this case, you have the option of connecting the DC cables to the inverter using a connecting distributor.

**Additional components required**

The following components are required for connecting DC cables via a connecting distributor:




- 2 connecting distributors (available from Fronius as an option)
- Cable lugs

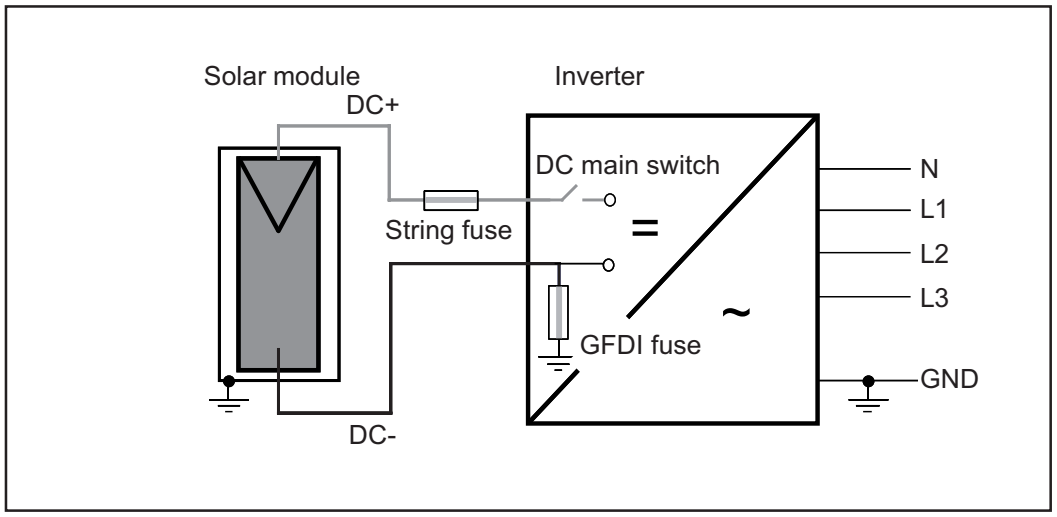
  Select the cable lugs according to the available DC cables
- Hexagon screws
- Hexagon nuts

  that fit the cable lugs

**Solar module ground**

The inverter is designed for a solar module ground at the negative pole. The solar module ground is carried out via a fuse in the inverter.

Solar module ground at negative pole with fuse:



**WARNING!** An electric shock can be fatal. Normally grounded conductors may be ungrounded and energized when a ground fault is indicated. The ground fault has to be repaired before operation is resumed.

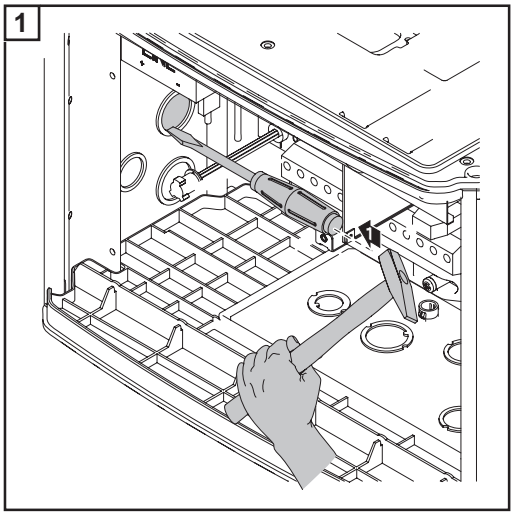
**NOTE!** Do not connect the ground to the negative DC line at any point! This is already done within the inverter. If negative DC lines are connected to the DC terminals or prior to this to the ground, this will circumvent the GFDI protection system, preventing your inverter from properly detecting a fault current.
In addition, turning the DC disconnect to the OFF/open circuit condition will not disconnect the array from ground, as it only disconnects the DC positive.

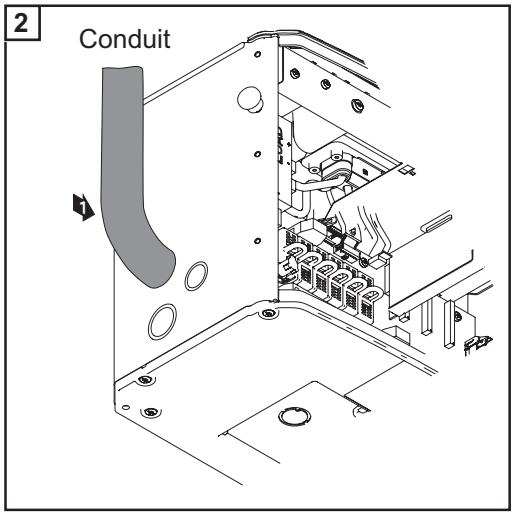
## Safety

**WARNING!** An electric shock can be fatal. Inadequately sized electrical components can cause serious injuries to persons and damage to (or loss of) property.

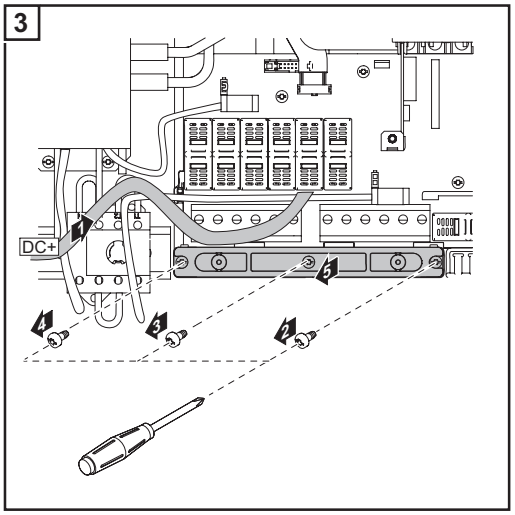
- All electrical installations must be carried out in accordance with the National Electrical Code, ANSI/NFPA 70, and any other codes and regulations applicable to the installation site.
- For installations in Canada, the installations must be done in accordance with applicable Canadian standards.
- Use copper wires for all grounding cables.
- See NEC section 250 for correct grounding.
- Use only solid or stranded wire. Do not use fine stranded wire.

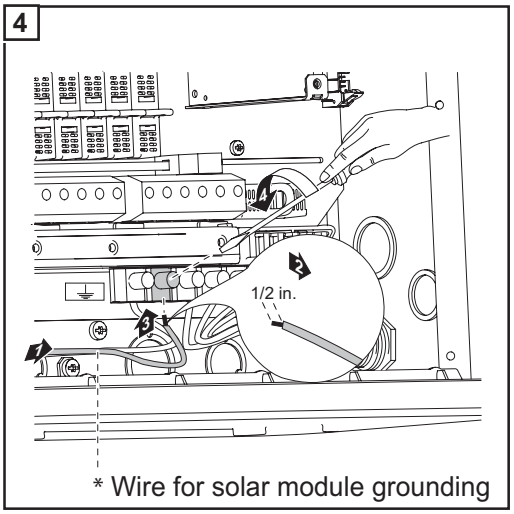
## Connecting combined solar module strings using connecting distributors



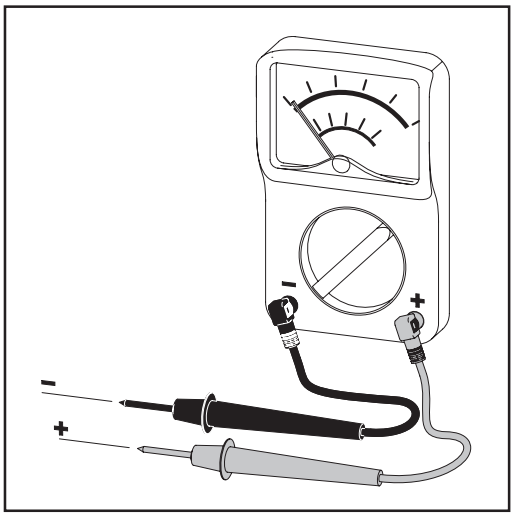

**NOTE!** Use only water tight conduit fittings and conduits. Conduit fittings and conduits are not part of the scope of supply for the inverter.




Tightening torque:
Stranded wires 1.25 ft. lb.
Solid wires 0.81 ft. lb.

**NOTE!** Connecting the DC wiring with the wrong polarity may cause damage to the inverter. Check both the polarity and the open circuit voltage.




The DC Voltage must not exceed 600 V, regardless of temperature.

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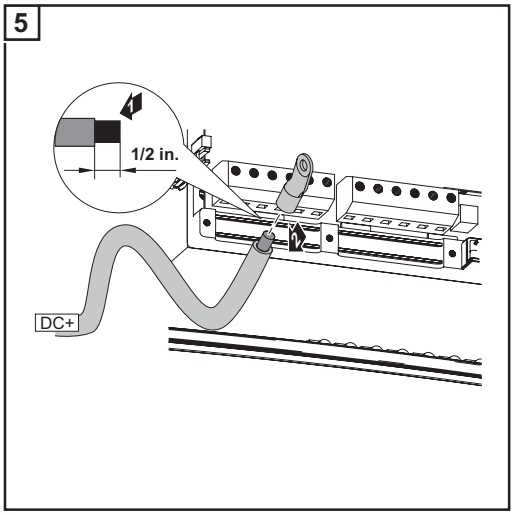


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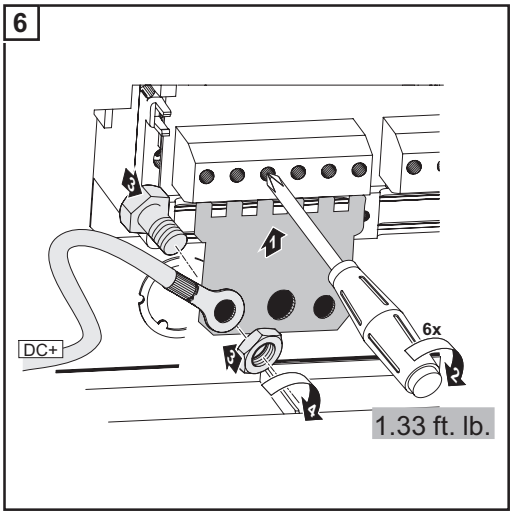


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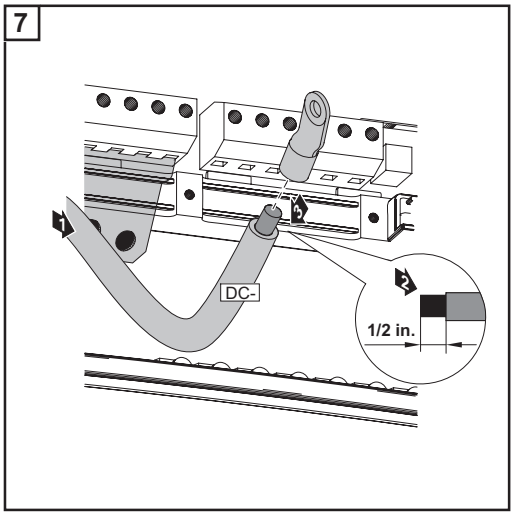


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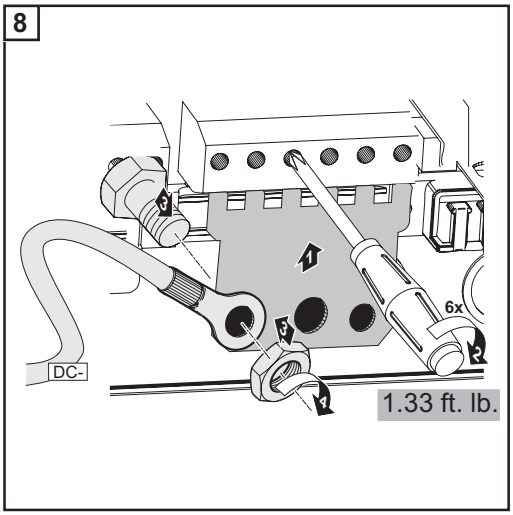



**NOTE!** Form a min. 4 in. wire loop using all wires.

**CAUTION!** Danger of damaging the inverter by overload. Before start-up operation make sure that there is a conductive slug in each fuse holder for string fuses.

- Insert conductive slugs only with a fuse cover in the respective fuse holder
- Do not operate the inverter without fuse covers

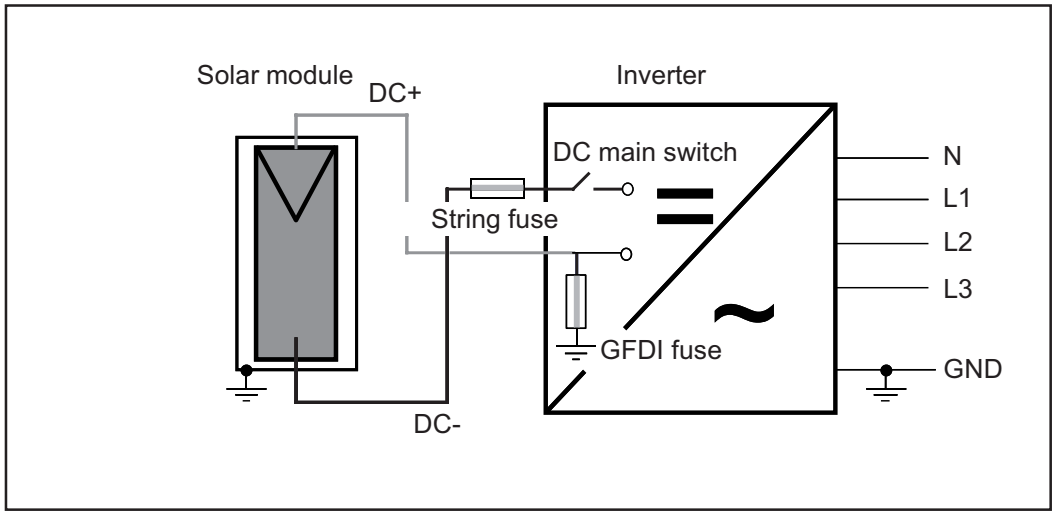
# Solar Module Ground at Positive Pole: Connecting Solar Module Strings

**General**

The following steps are necessary when the solar module manufacturer requires a solar module ground at the positive pole.

**Solar module ground at positive pole**

Solar module ground at positive pole with fuse:




**WARNING!** An electric shock can be fatal. Normally grounded conductors may be ungrounded and energized when a ground fault is indicated. The ground fault has to be repaired before operation is resumed.

**NOTE!** Do not connect the ground to the positive DC line at any point! This is already done within the inverter. If positive DC lines are connected to the DC terminals or prior to this to the ground, this will circumvent the GFDI protection system, preventing your inverter from properly detecting a fault current.
In addition, turning the DC disconnect to the OFF/open circuit condition will not disconnect the array from ground, as it only disconnects the DC negative.

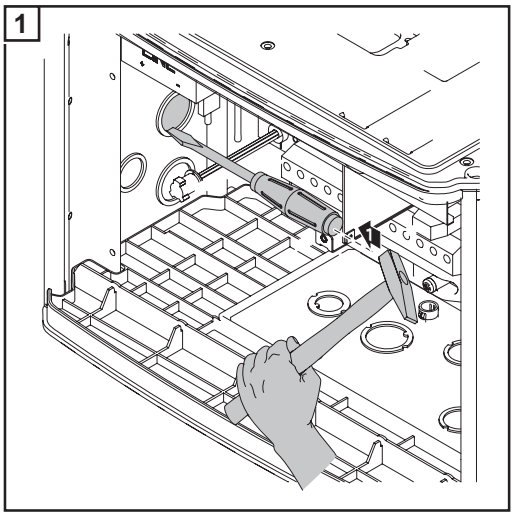
**Wire cross section of solar module strings**

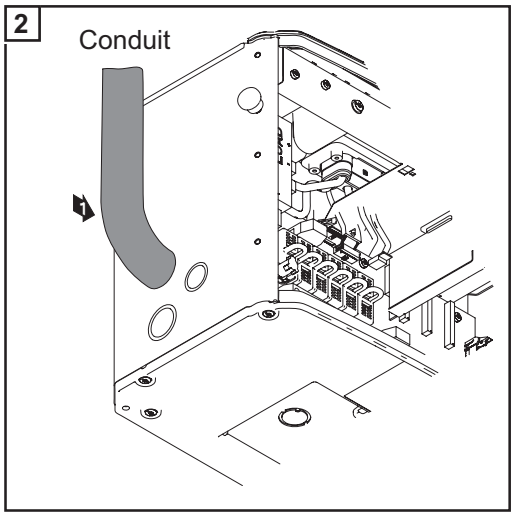
**WARNING!** An electric shock can be fatal. Inadequately sized electrical components can cause serious injuries to persons and damage to (or loss of) property.

- All electrical installations must be carried out in accordance with the National Electrical Code, ANSI/NFPA 70, and any other codes and regulations applicable to the installation site.
- For installations in Canada, the installations must be done in accordance with applicable Canadian standards.
- Use minimum AWG 14, min. 167 °F (75 °C), copper wire for all grounding wires (see NEC table 250.122).
- Use minimum AWG 14 to maximum AWG 6, min. 167°F (75°C), copper wire for all DC wiring connections to the inverter. Voltage drop and other considerations may dictate larger size wires be used.
- Use only solid or stranded wire. Do not use fine stranded wire.

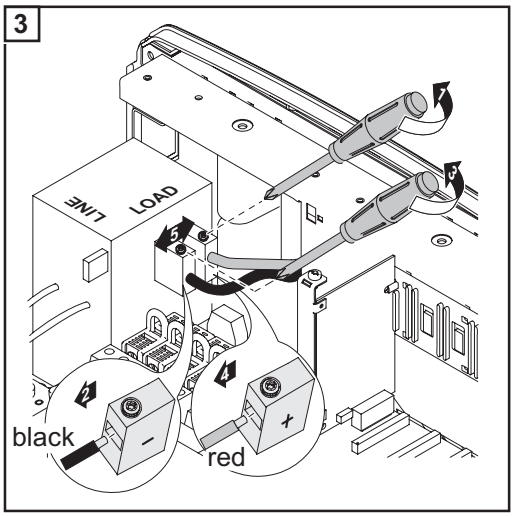
**NOTE!** To ensure an effective strain relief device for solar module strings, only use cable cross sections of the same size.

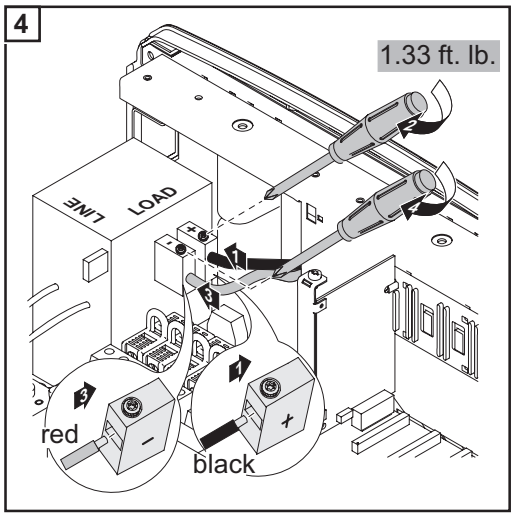
**Solar module ground at positive pole: Connecting solar module strings**




**NOTE!** Use only water tight conduit fittings and conduits. Conduit fittings and conduits are not part of the scope of supply for the inverter.



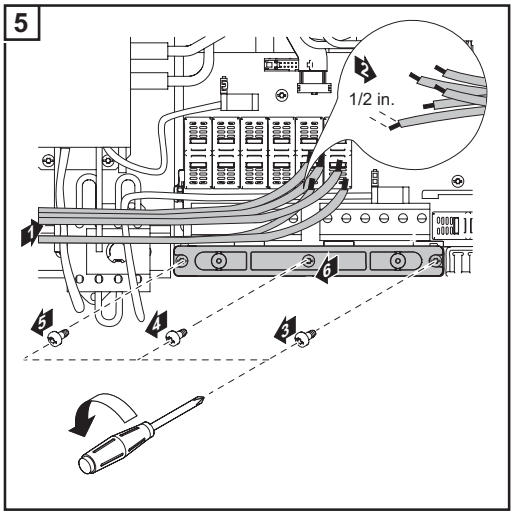




After disconnecting the DC filter wire:

- Connect the red DC+ wire to the DC- connection of the DC filter as per step 4
- Connect the black DC- wire to the DC+ connection of the DC filter as per step 4

**NOTE!** Identify the reversed polarity accordingly with (+) and (-) at the DC terminals.

5

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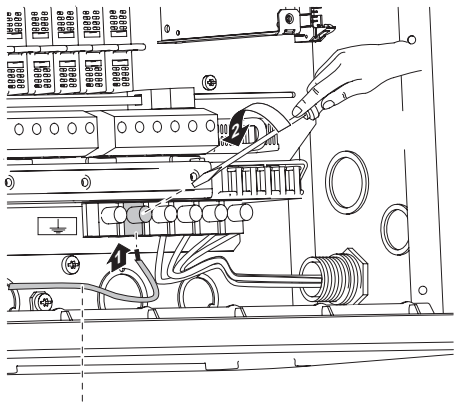
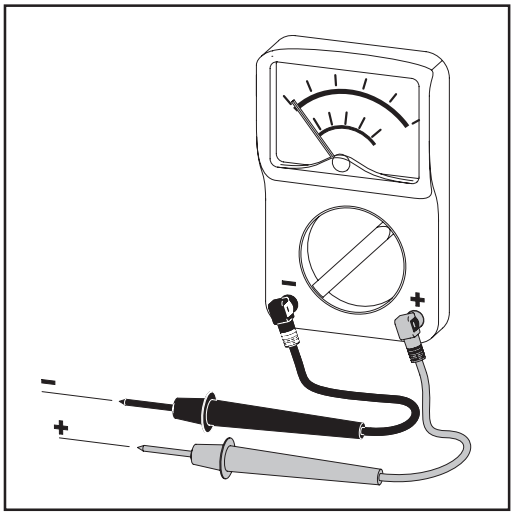


* Wire for solar module grounding

Tightening torque:
Stranded wires 1.25 ft. lb.
Solid wires 0.81 ft. lb.

**NOTE!** Connecting the DC wiring with the wrong polarity may cause damage to the inverter. Check both the polarity and the open circuit voltage.

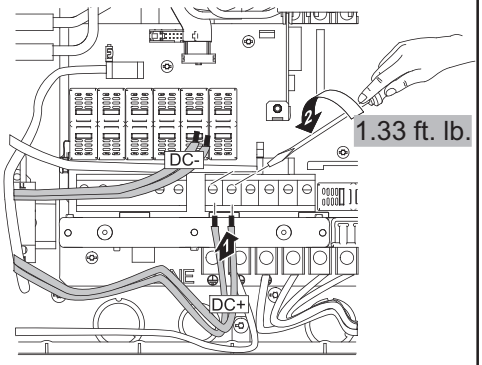
The DC Voltage must not exceed 600 V, regardless of temperature.



**CAUTION!** Danger of damaging the inverter by overload.

- Only connect a maximum of 20 A to an individual DC terminal.
- Connect the DC+ wire to the right connection of the inverter's DC terminals.
- Connect the DC- wire to the left connection of the inverter's DC terminals.

7




Tightening torque for solid and stranded wires

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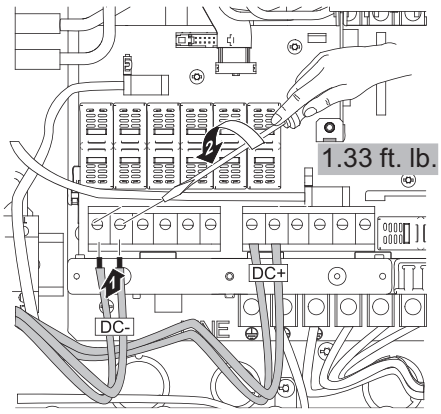
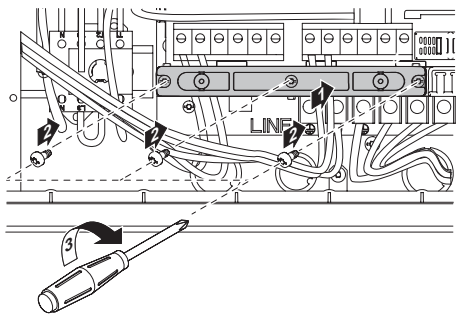



Tightening torque for solid and stranded wires

**NOTE!** Form a min. 4 in. wire loop using all wires.

9

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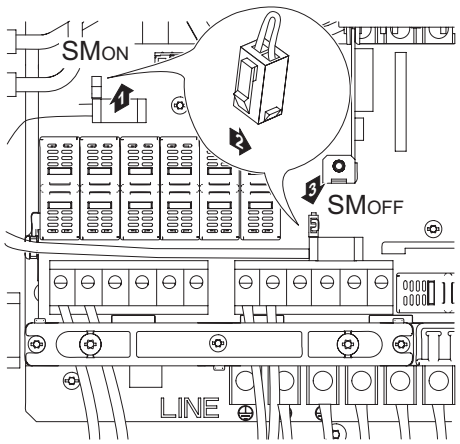
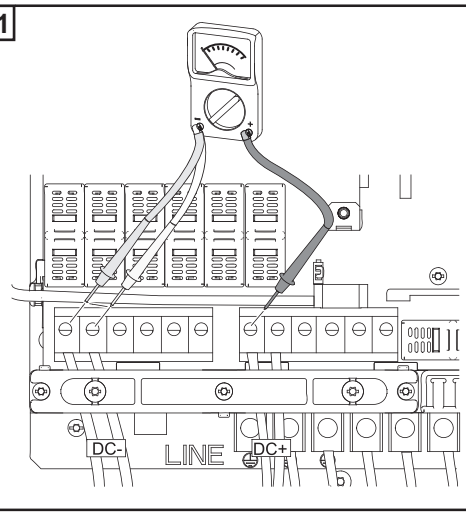



**IMPORTANT!**

- Set the jumper from the '$SM_{ON}$' position to the '$SM_{OFF}$' position for correct measurement results
- Check the polarity and voltage of the solar module strings: the voltage should be a max. of 600 V, the difference between the individual solar module strings should be a max. of 10 V.

11

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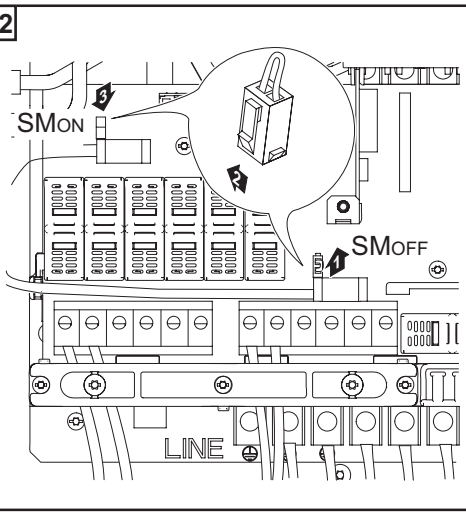



**Inserting string fuses**

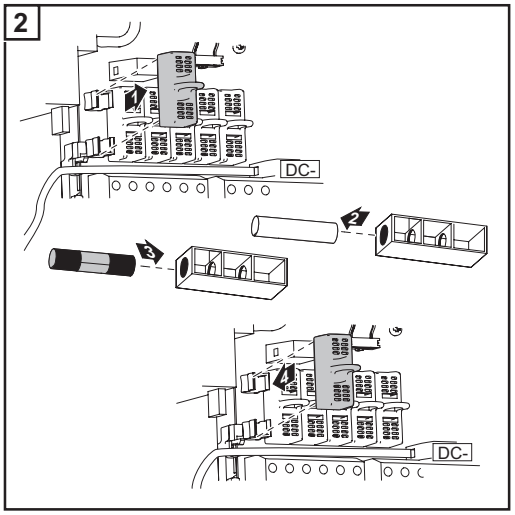
**IMPORTANT** The inverter is shipped with conductive slugs in the fuse holders. Series fusing may be required depending on the type of solar module used in the system.
See NEC 690.9.

1 Select string fuses according to the information from the solar module manufacturer or as per ‘Criteria for the proper selection of string fuses’ (max. 20 A per individual DC terminal)

**IMPORTANT!**

- Follow all solar module safety instructions
- Follow all solar module manufacturer requirements

**WARNING!** An electric shock can be fatal. Danger from DC voltage from solar modules. Fuse covers are for installation purposes only. They offer no protection against contact.




**NOTE!**

- Insert fuses only with a fuse cover in the respective fuse holder
- Do not operate the inverter without fuse covers

# Criteria for the Proper Selection of String Fuses

USA

**DC disconnect requirements**

NEC 690.15-18 allows the use of fuse holders as a suitable means of disconnecting PV arrays for servicing.
Additional DC disconnects external to the inverter may be required by the local authority having jurisdiction.

**General**

The use of string fuses in the inverter also adds fuse protection to the solar modules.
A crucial factor for the fuse protection of solar modules is the maximum short circuit current $I_{sc}$ of the respective solar module.

**Criteria for the proper selection of string fuses**

The following criteria must be fulfilled for each solar module string when using fuse protection:

- $I_N > 1.56 \times I_{SC}$
- $I_N < 2.00 \times I_{SC}$
- $V_N >/= 600$ V DC
- Fuse dimensions: Diameter 0.41 x 1.38 - 1.50 in. (10.3 x 35 -38 mm)

$I_N$ Nominal current rating of fuse

$I_{SC}$ Short circuit current for standard test conditions (STC) according to solar module data sheet

$V_N$ Nominal voltage rating of fuse

**NOTE!** The string fuse size must not be greater than the maximum fuse size rating of the PV module as provided on the PV module manufacturers data sheet. If no maximum fuse size is indicated, please contact the PV module manufacturer.

**Effects of Using Underrated Fuses**

In underrated fuses, the nominal current value is less than the short circuit current of the solar module.
Effect:
The fuse may trip in intensive lighting conditions.

**Fuse Recommendations**

**NOTE!** Only select fuses suitable for a voltage of 600 V DC.

You should only use the following fuses, which have been tested by Fronius, to ensure problem-free fuse protection:

- Littelfuse KLKD fuses
- Cooper Bussmann PV fuses

Fronius shall not be liable for any damage or other incidents resulting from the use of other fuses. In addition, all warranty claims are forfeited.

**Application example**

Example: Maximum short circuit current ($I_{SC}$) of the solar module = 5.75 A

According to the criteria for selecting the correct fuse, the fuse must have a nominal current greater than 1.56 times the short circuit current:
5.75 A x 1.56 = 8.97 A

The fuse that should be selected according to the ‘Fuses’ table:
KLK D 9 with 9.0 A and 600 V AC / DC

**Fuses**

| Nominal current value | Fuse | Nominal current value | Fuse |
|---|---|---|---|
| 1.0 A | KLK D 1 | 6.0 A | KLK D 6 |
| 1.5 A | KLK D 1 1/2 | 7.0 A | KLK D 7 |
| 2.0 A | KLK D 2 | 8.0 A | KLK D 8 |
| 2.5 A | KLK D 2 1/2 | 9.0 A | KLK D 9 |
| 3.0 A | KLK D 3 | 10.0 A | KLK D 10 |
| 3.5 A | KLK D 3 1/2 | 12.0 A | KLK D 12 |
| 4.0 A | KLK D 4 | 15.0 A | KLK D 15 |
| 5.0 A | KLK D 5 | 20.0 A | KLK D 20 |

"Fuses" Table: Excerpt of Suitable Fuses, e.g., Littelfuse Fuses

# Solar module ground at positive pole: Connecting combined solar module strings using connecting distributors



**General**

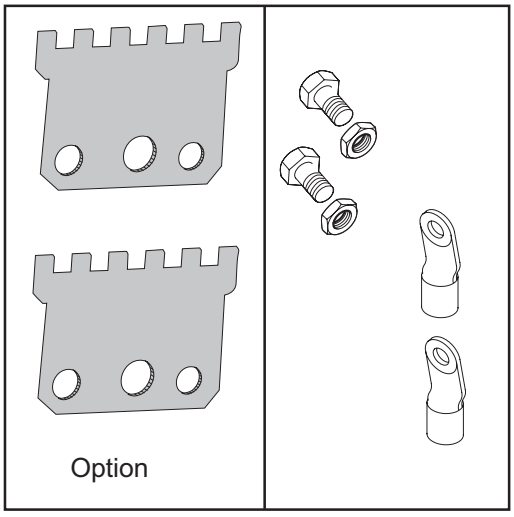
The following steps are necessary when the solar module manufacturer requires a solar module ground at the positive pole.

If several solar module strings are combined outside of the inverter into one solar module string, the current of the solar module string can be higher than the current permitted for a DC terminal (20 A).

In this case, you have the option of connecting the DC cables to the inverter using a connecting distributor.

**Additional components required**

The following components are required for connecting DC cables via a connecting distributor:



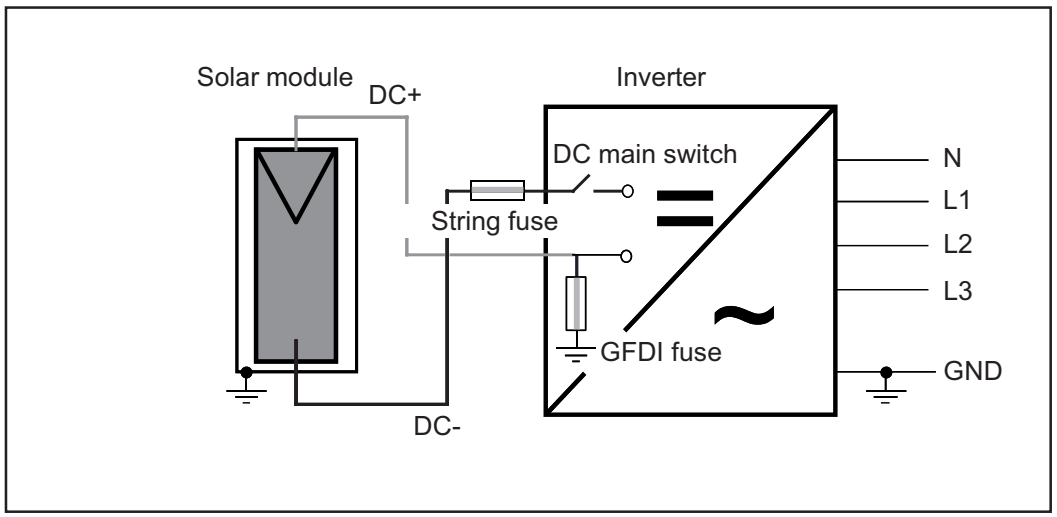

- 2 connecting distributors (available from Fronius as an option)
- Cable lugs

  Select the cable lugs according to the available DC cables
- Hexagon screws
- Hexagon nuts

  that fit the cable lugs

**Solar module ground at positive pole**

Solar module ground at positive pole with fuse:




**WARNING!** An electric shock can be fatal. Normally grounded conductors may be ungrounded and energized when a ground fault is indicated. The ground fault has to be repaired before operation is resumed.

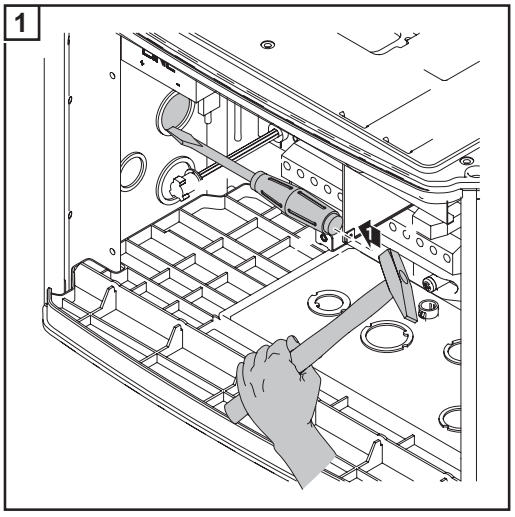
**NOTE!** Do not connect the ground to the positive DC line at any point! This is already done within the inverter. If positive DC lines are connected to the DC terminals or prior to this to the ground, this will circumvent the GFDI protection system, preventing your inverter from properly detecting a fault current.
In addition, turning the DC disconnect to the OFF/open circuit condition will not disconnect the array from ground, as it only disconnects the DC negative.

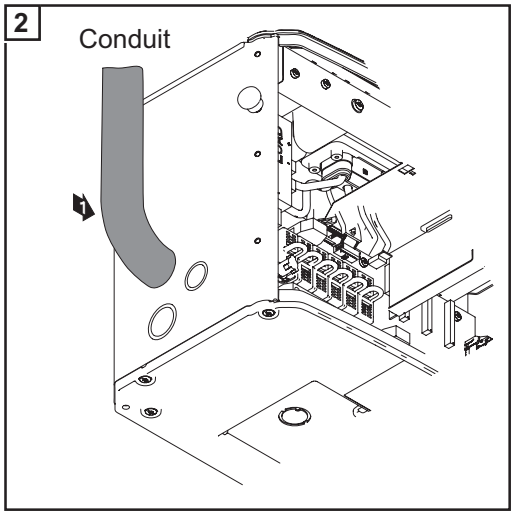
**Safety**

**WARNING!** An electric shock can be fatal. Inadequately sized electrical components can cause serious injuries to persons and damage to (or loss of) property.

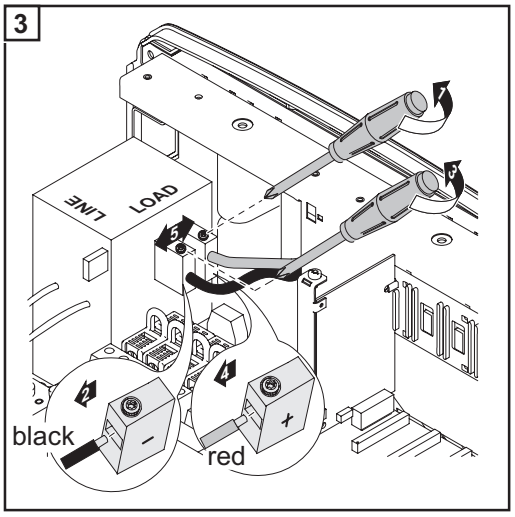
- All electrical installations must be carried out in accordance with the National Electrical Code, ANSI/NFPA 70, and any other codes and regulations applicable to the installation site.
- For installations in Canada, the installations must be done in accordance with applicable Canadian standards.
- Use copper wires for all grounding cables.
- See NEC section 250 for correct grounding.
- Use only solid or stranded wire. Do not use fine stranded wire.

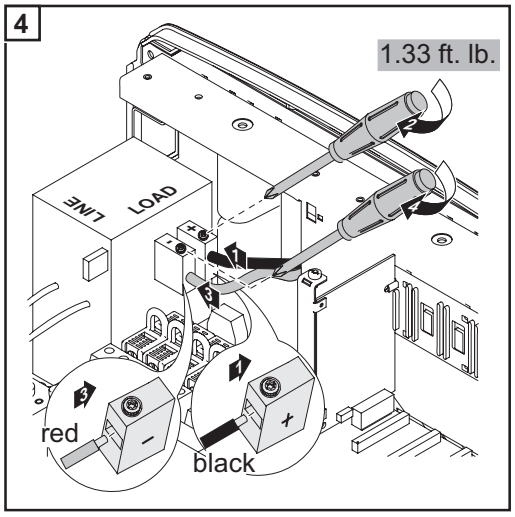
**Solar module ground at positive pole: Connecting combined solar module strings using connecting distributors**




**NOTE!** Use only water tight conduit fittings and conduits. Conduit fittings and conduits are not part of the scope of supply for the inverter.

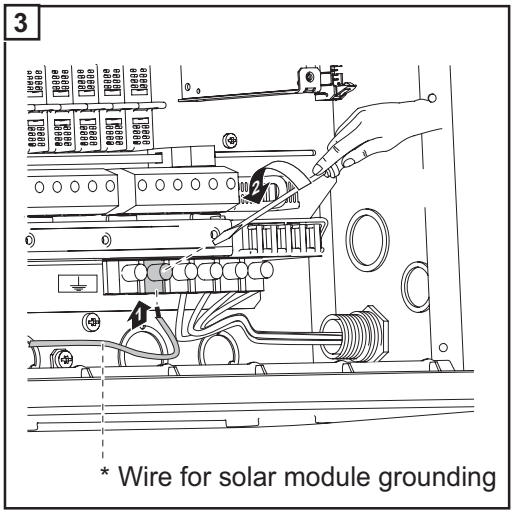


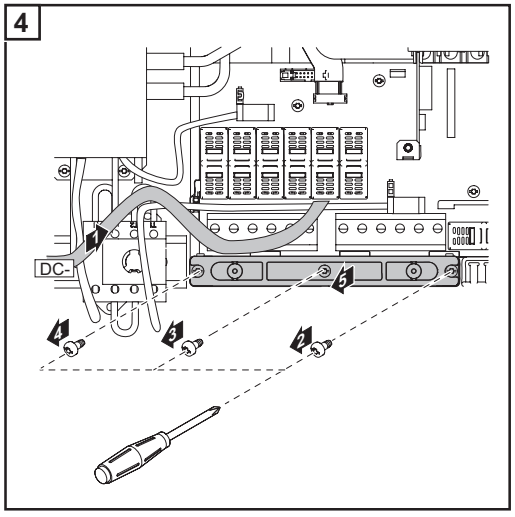




After disconnecting the DC filter wire:

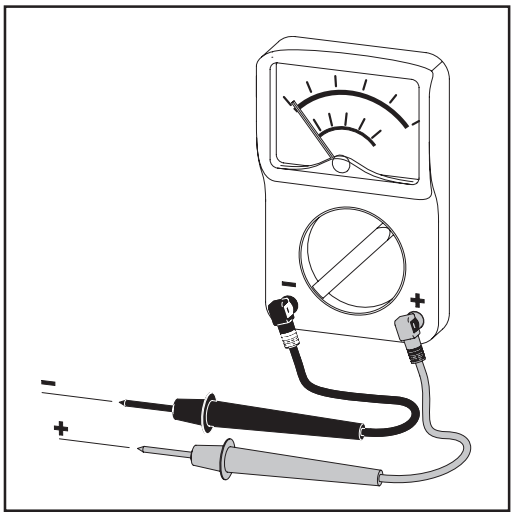
- Connect the red DC+ wire to the DC- connection of the DC filter as per step 4
- Connect the black DC- wire to the DC+ connection of the DC filter as per step 4

**NOTE!** Identify the reversed polarity accordingly with (+) and (-) at the DC terminals.



Tightening torque:
Stranded wires 1.25 ft. lb.
Solid wires 0.81 ft. lb.

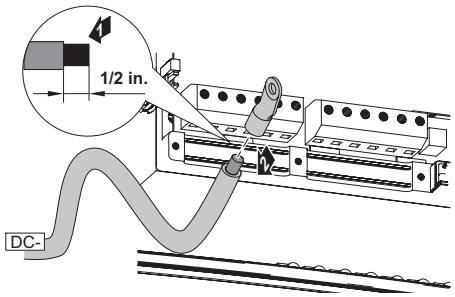


**NOTE!** Connecting the DC wiring with the wrong polarity may cause damage to the inverter. Check both the polarity and the open circuit voltage.

The DC Voltage must not exceed 600 V, regardless of temperature.

**CAUTION!** Danger of damaging the inverter by overload.
- Connect the DC+ wire to the right connection of the inverter's DC terminals.
- Connect the DC- wire to the left connection of the inverter's DC terminals.

7

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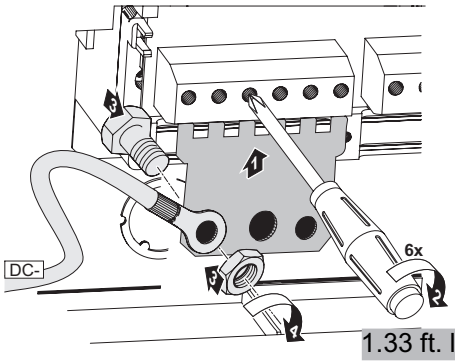


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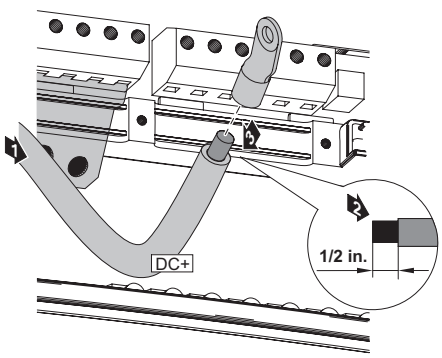


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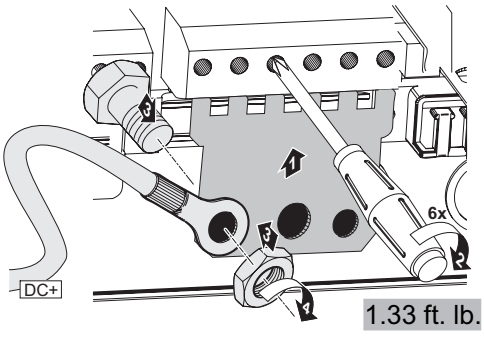


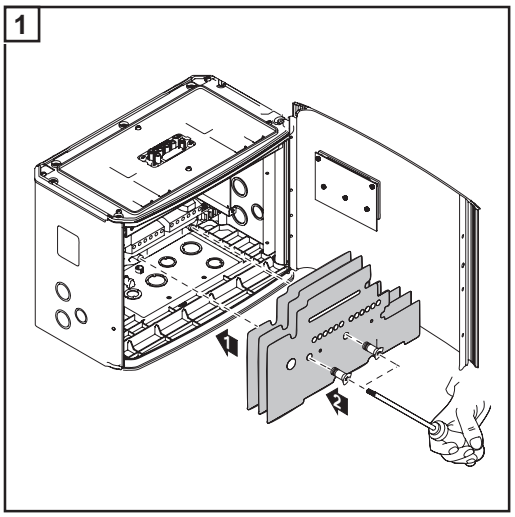
**NOTE!** Form a min. 4 in. wire loop using all wires.

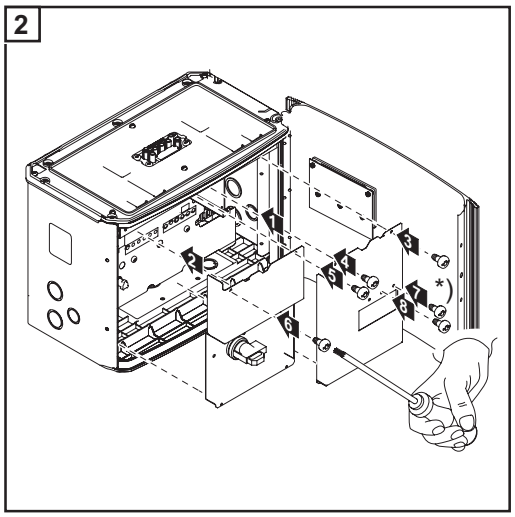
**CAUTION!** Danger of damaging the inverter by overload. Before start-up operation make sure that there is a conductive slug in each fuse holder for string fuses.

- Insert conductive slugs only with a fuse cover in the respective fuse holder
- Do not operate the inverter without fuse covers

# Attaching power stage sets and closing the Fronius IG Plus

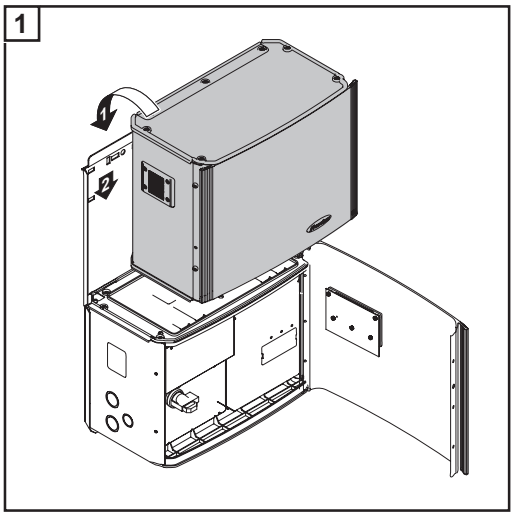
**Preparation**

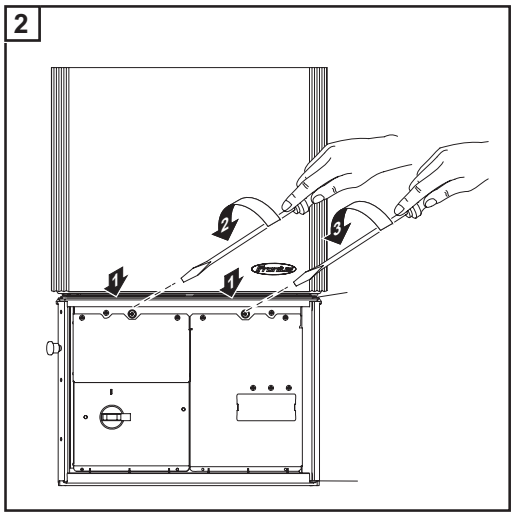



*) Attach all fixing screws from any available option cards.

**Attaching power stage sets and closing the Fronius IG Plus**




The inverter is now operational.

**Opening Fronius IG Plus for service/maintenance**

Procedure for opening the inverter for service or maintenance:

1 Disconnect AC and DC supply from the inverter
2 Open the connection area
3 Turn off DC main switch
4 Allow the capacitors to discharge (5 minutes)
5 Remove metal covers
6 Remove the plastic dividers
7 Remove string fuses

8 Disconnect DC wires
9 Disconnect AC wires

# Commissioning

**Factory pre-set configuration**

The inverter has been pre-configured in the factory and is ready for operation. You only have to set the available power grid for startup.

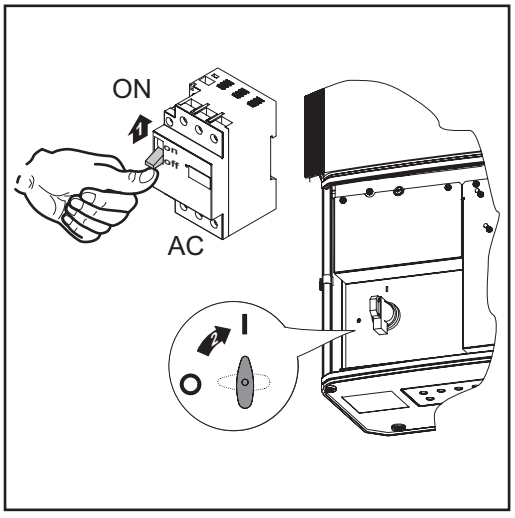
To change your inverter settings, please see section ‘The setup menu’ in the chapter ‘Operation.’

**Requirements for start-up operation**

- Inverter connected to the public grid (AC)
- Inverter connected to solar modules (DC)
- 3 plastic dividers inserted
- 2 metal covers mounted
- Power stage set mounted

**NOTE!** Do not operate the inverter without fuse covers.

**Start-up operation**

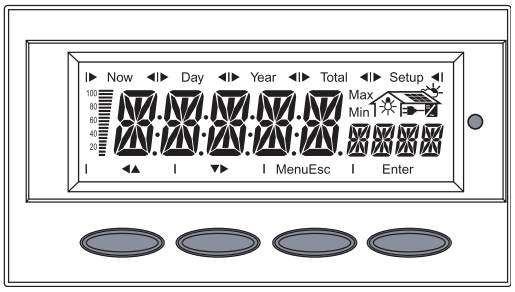



1 Turn on AC disconnect

2 Flip DC main switch to position - 1 -

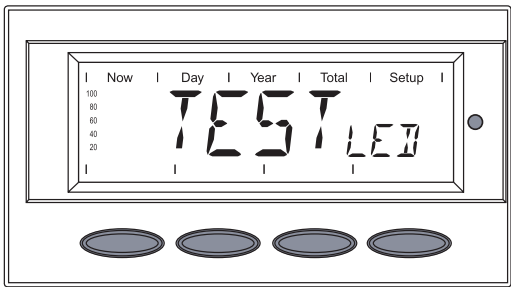
As soon as the photovoltaic modules produce sufficient power, the Operating Status LED lights up orange.

The orange LED indicates that the feed-in mode of the inverter will begin shortly.

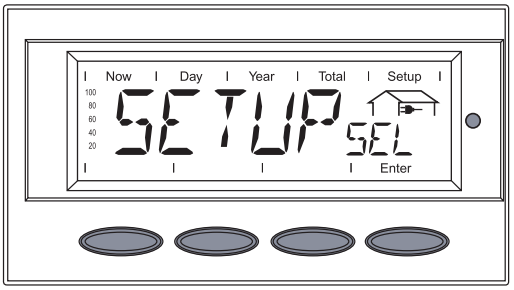



The screen displays the startup phase.

- Segment test
  All display elements light up for about one second

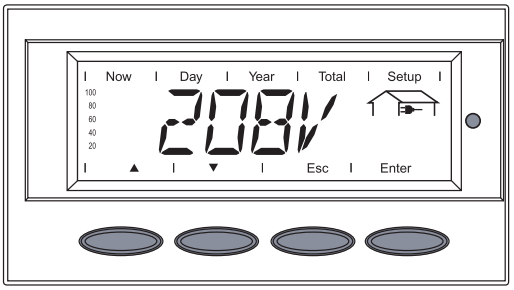



- The inverter goes through a master check list for several seconds
  The display shows ‘TEST’ and indicates the respective component that is being tested (for example, ‘LED’)




- The grid selection phase begins: 'SETUP SEL' is shown

3 Press the ‘Enter’ key



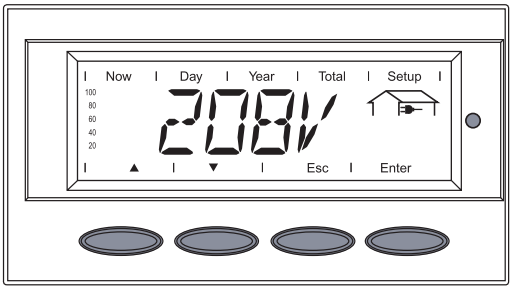

The first grid selection option is shown (e.g., 208 V)

4 Select the grid

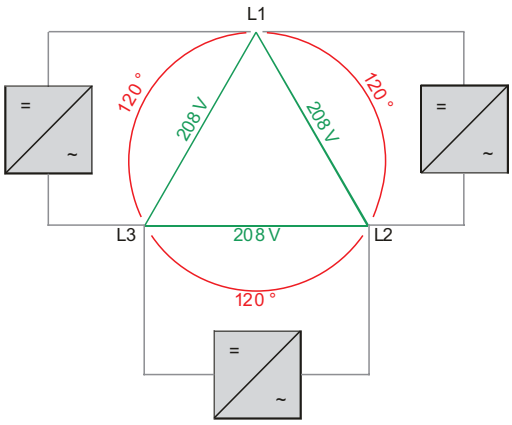
**Selecting the grid**

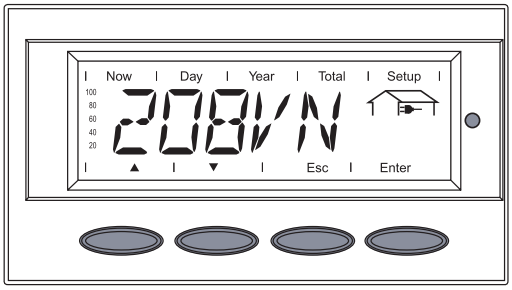
Several grid selection options are displayed depending on the product type (see also section 'Connecting the Fronius IG Plus to the public grid’).

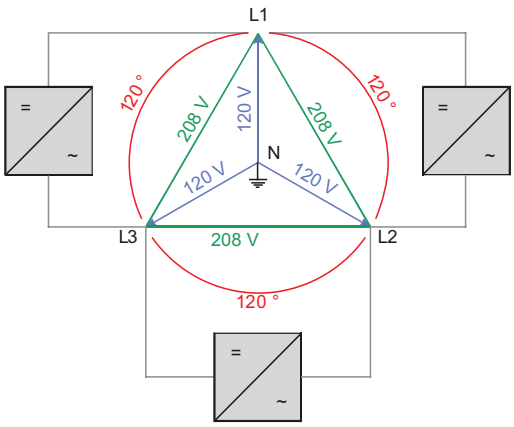
1 Use the ‘Up’ and ‘Down’ keys to select the desired grid:
▲ ▼



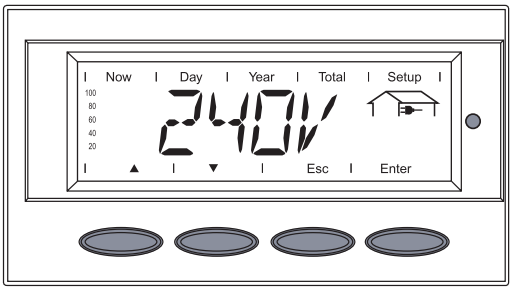

Grid voltage 208 V Delta
No neutral conductor in the system
Neutral conductor monitoring is deactivated

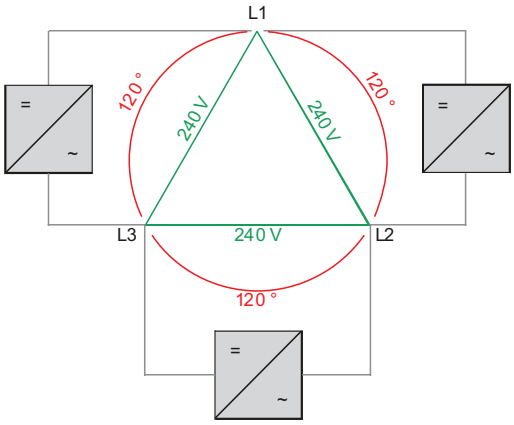




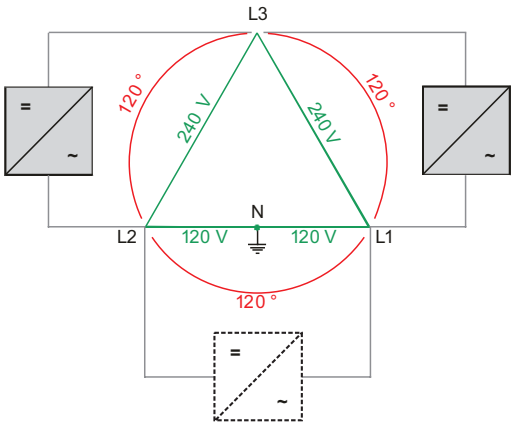



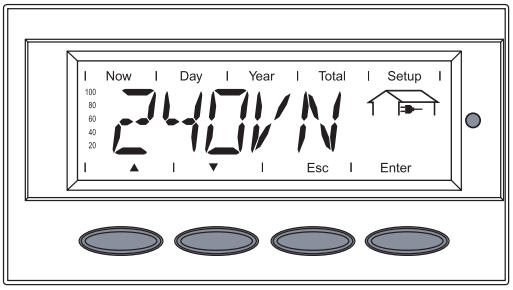

Grid voltage 208 V Delta: 120 V WYE
Neutral conductor available in the system
Neutral conductor monitoring is activated

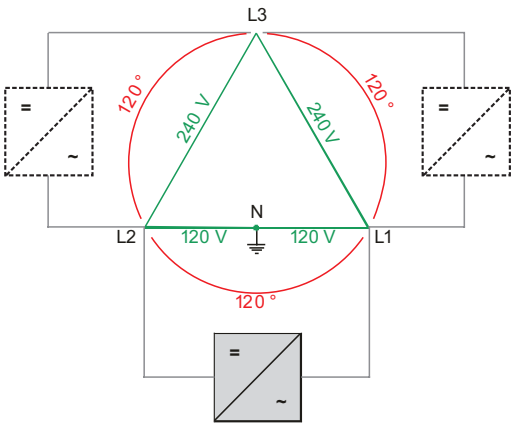


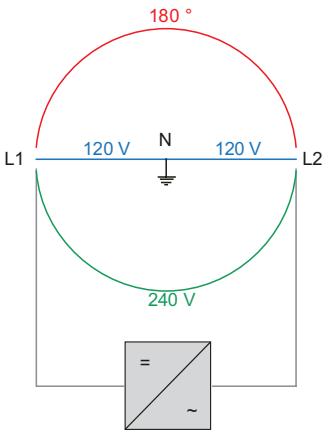

Grid voltage 240 V Delta
No neutral conductor in the system
Neutral conductor monitoring is deactivated



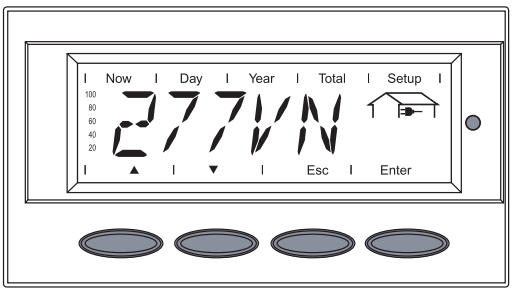


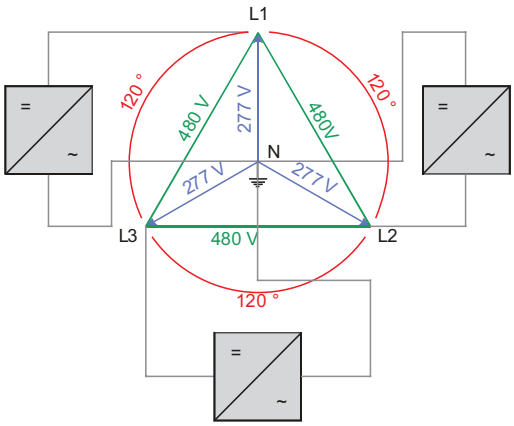




Grid voltage 240 V: 120 V Stinger
Neutral conductor available in the system
Neutral conductor monitoring is activated




Grid voltage 240 V: 120 V Split Phase
Neutral conductor available in the system
Neutral conductor monitoring is activated



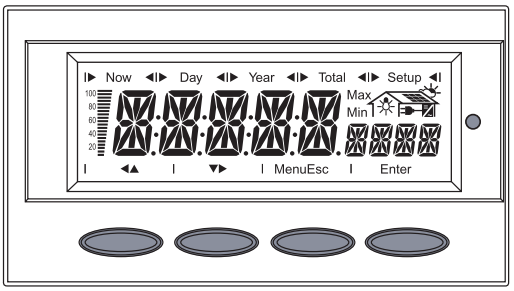




Grid voltage 480 V Delta: 277 V WYE
Neutral conductor available in the system
Neutral conductor monitoring is activated

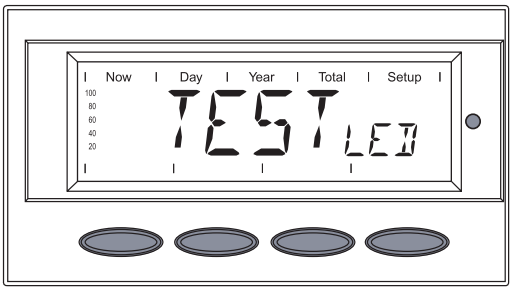
2 Press the 'Enter' key 2x to confirm your grid selection (or use the 'Esc' key to return to grid selection)

The startup phase restarts with the segment test.

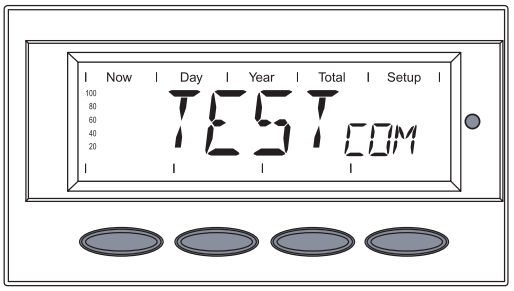
**Startup phase during startup operation**



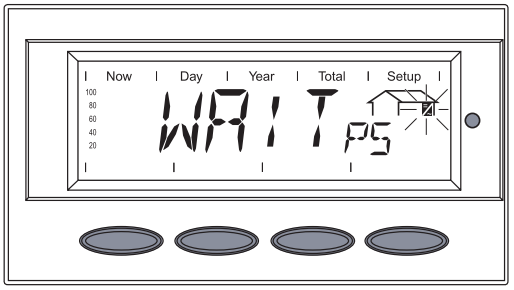

- Segment test
  All display elements light up for about one second.



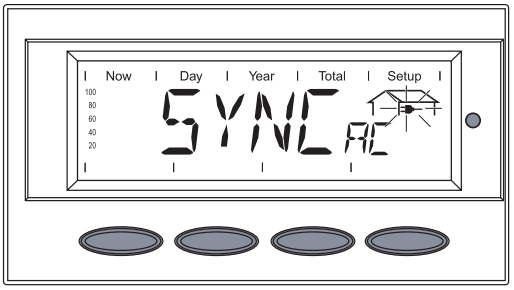

- The inverter goes through a master check list for several seconds.
  The display shows ‘TEST’ and indicates the respective component that is being tested (for example, ‘LED’)



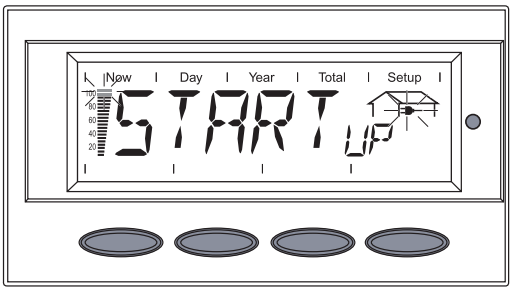

- ‘TEST COM’ is shown.



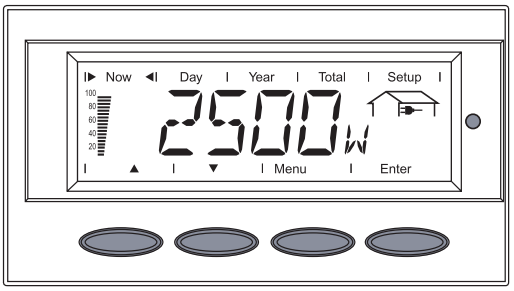

- Synchronization with grid:
  ‘WAIT PS’ is displayed, the inverter icon flashes: the inverter is waiting for all power stage sets in the network to be on stand-by. This procedure takes place dependent on the DC voltage.




- Next, the display shows ‘SYNC AC,’ the grid icon flashes.




- Startup test:
  Before the inverter starts feeding energy into the grid, the conditions of the grid are tested in detail in accordance with local regulations. The display shows ‘START UP.’



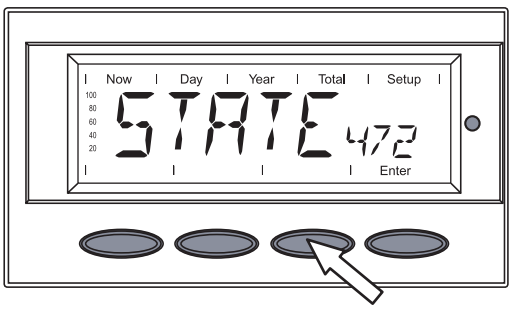

- Operation of feeding energy into the grid:
  After selecting the grid and when the tests are concluded, the inverter starts feeding energy into the grid.
  The display shows the present power feeding into the grid.
  The Operating Status LED lights up green, and the inverter starts operating.

**IMPORTANT!** For more information about the startup phase, please see the chapter 'Operation', section 'Product description Fronius IG Plus' (Startup Phase, Test Procedure).

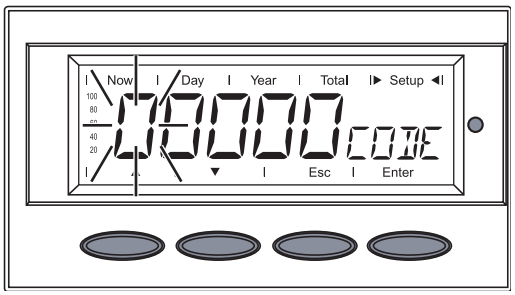
**Setting inverter for solar module ground at the positive pole**

If the inverter will be operated with solar modules that require a solar module ground at the positive pole, the corresponding grounding method must be set in the ‘Basic Service’ menu.
A 5-digit code is required for accessing the ‘Basic Service’ menu. This access code will be provided by Fronius upon request.

If solar modules are connected to the inverter that require a solar module ground at the positive pole, the status message 472 "Ground fault detected" will be displayed after the inverter is turned on and the startup phase is completed.



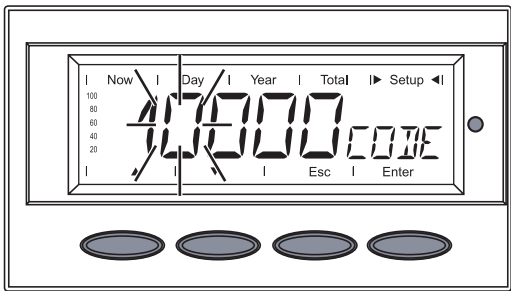

1 Press the unoccupied ‘Esc’ key 5 x




‘CODE’ is displayed, the first digit flashes.

2 Use the ‘Up’ and ‘Down’ keys to select a value for the first digit of the access code
▲ ▼

3 Press the ‘Enter’ key

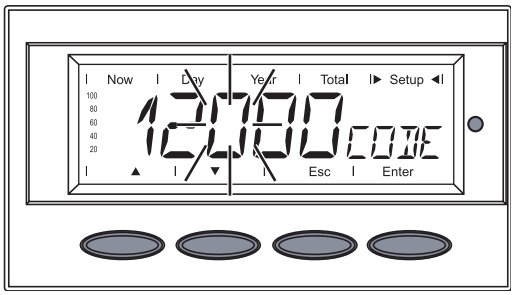



The second digit flashes.

4 Use the ‘Up’ and ‘Down’ keys to select a value for the second digit of the access code

▲ ▼

5 Press the ‘Enter’ key

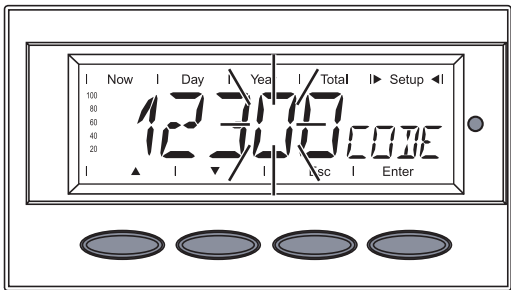



The third digit flashes.

6 Use the ‘Up’ and ‘Down’ keys to select a value for the third digit of the access code

▲ ▼

7 Press the ‘Enter’ key

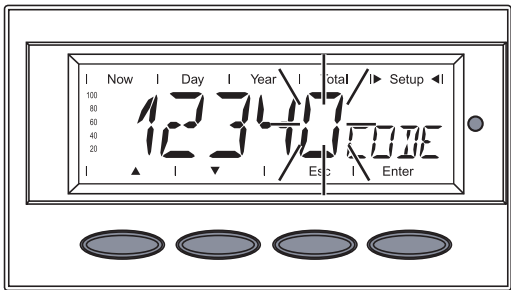



The fourth digit flashes.

8 Use the ‘Up’ and ‘Down’ keys to select a value for the fourth digit of the access code

▲ ▼

9 Press the ‘Enter’ key

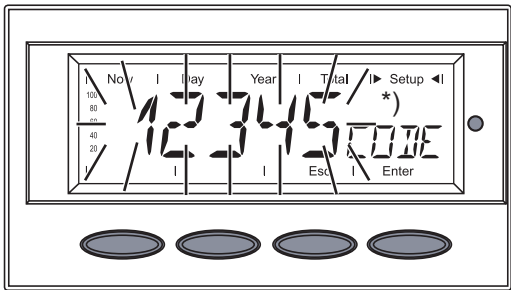



The fifth digit flashes.

10 Use the ‘Up’ and ‘Down’ keys to select a value for the fifth digit of the access code

▲ ▼

11 Press the ‘Enter’ key

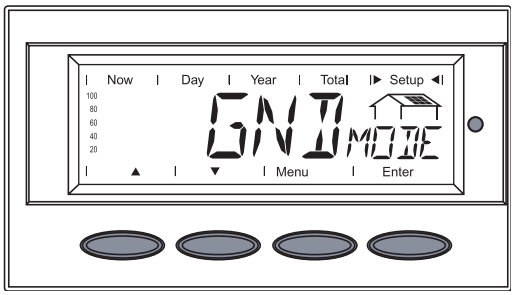



The access code flashes.
*) ... Code example

12 Press the ‘Enter’ key

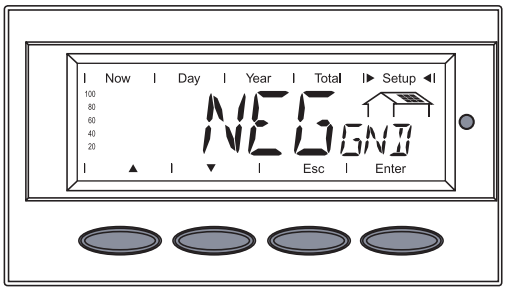
The inverter is now in the ‘Basic Service’ menu, the first parameter is displayed:

- ‘MIX MODE’ for multiphase inverters
- ‘DC MODE’ for single-phase inverters



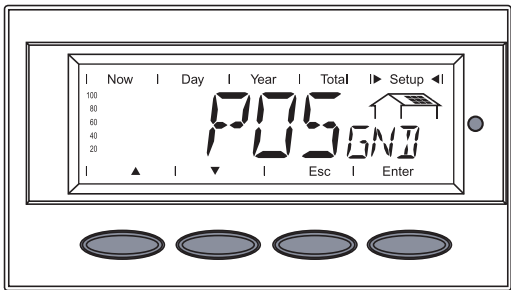

13 Use the ‘Up’ and ‘Down’ keys to select the ‘GND MODE’ parameter
▲ ▼

14 Press the ‘Enter’ key




The set grounding method is displayed.

15 Use the ‘Up’ and ‘Down’ keys to select the corresponding ‘POS GND’ grounding method:
▲ ▼




POS = solar module ground at the positive pole

16 Press the ‘Enter’ key to apply the required grounding method

17 Press the ‘Esc’ key to exit the ‘Basic Service’ menu

# Inserting Option Cards

**Suitable option cards**

There are several options and system upgrades available for the inverter, e.g.:

- Datalogger and modem interface, Ethernet/Internet connection (for using a PC to record and manage data from your photovoltaic system)
- Various large displays (Fronius Public Display)
- Fronius Personal Display

System upgrades are available as plug-in cards and as external boxes. The Fronius IG Plus 12.0-3 WYE 277 is designed for three option cards, all other Fronius IG Plus products are designed for two option cards.

**Safety**

**WARNING!** An electric shock can be fatal. Danger from grid voltage and DC voltage from solar modules.

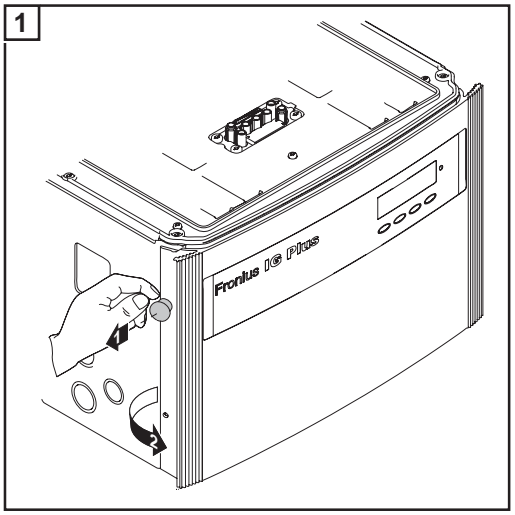
- The connection area should only be opened by a licensed electrician.
- Never work with live wires! Prior to all connection work, make sure that the AC and DC wires are not charged.
- All electrical installations must be carried out in accordance with the National Electrical Code, ANSI/NFPA 70, and any other codes and regulations applicable to the installation site.
- For installations in Canada, the installations must be done in accordance with applicable Canadian standards.

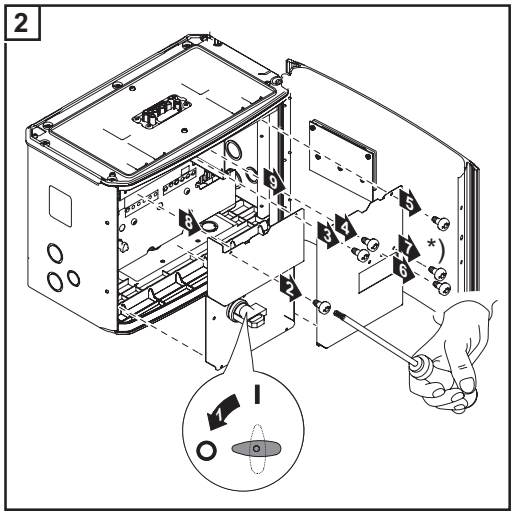
**WARNING!** An electric shock can be fatal. Danger from residual voltage from capacitors.
You must wait until the capacitors have discharged. Discharge takes 5 minutes.

**NOTE!** Follow general ESD precautions when handling option cards.

**Opening the inverter**

When adding option cards to the inverter, please follow all inverter safety instructions and information before opening the inverter.



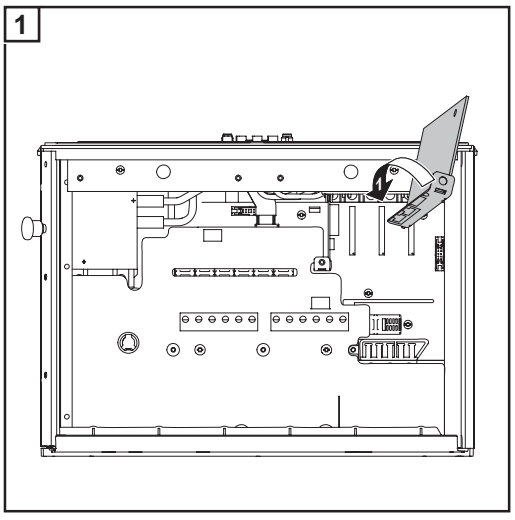

*) Remove all fixing screws from any available option cards.

**IMPORTANT!** The plastic dividers are used to separate the data communication wires from the AC and DC wires:

- Data communication wires must be laid above the plastic dividers
- AC and DC wires are laid under the plastic dividers

Make sure that the plastic dividers are present.

**Inserting option cards**



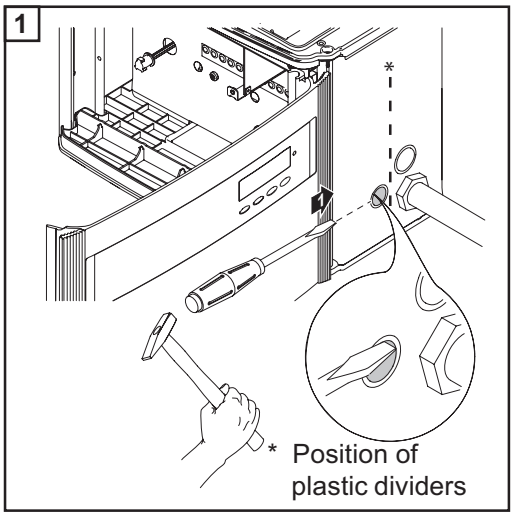

Insert option cards into free slots.

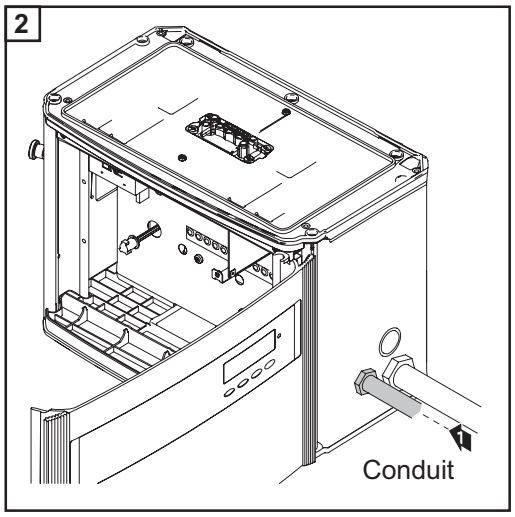
**Connecting option cards, laying data communication wires**

**CAUTION!** Danger of short circuit by loose metal parts from knockouts. Loose metal parts in the inverter may cause short circuits when the inverter is powered up. When removing knockouts, make sure that

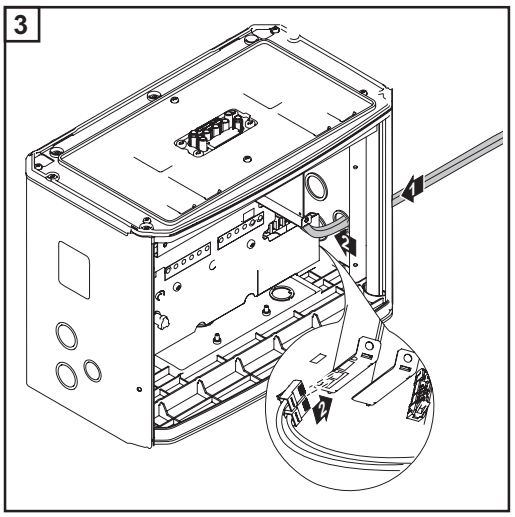
- no loose metal parts fall into the inverter
- any metal pieces that do fall into the inverter are removed immediately

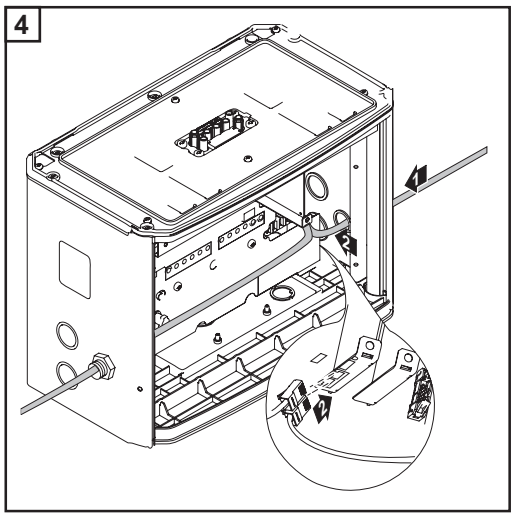
**NOTE!** The knockout for the data communication wires must be above the plastic dividers so that the plastic dividers are always under the data communication wires.




**NOTE!** Use only water tight conduit fittings and conduits. Conduit fittings and conduits are not part of the scope of supply for the inverter.



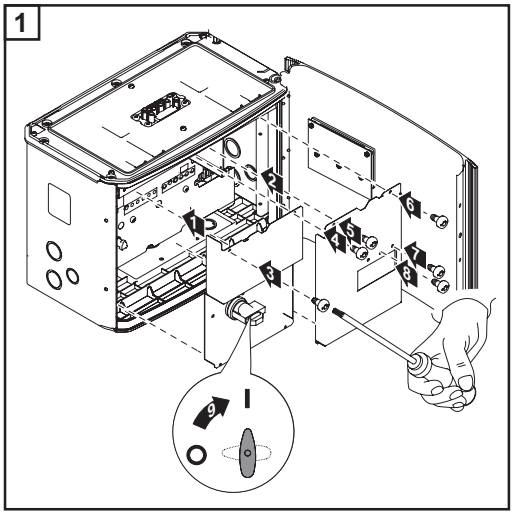

3 = one wire input for both data communication wires

4 = separated wire inputs on opposite sides (e.g., when several inverters are installed next to each other)

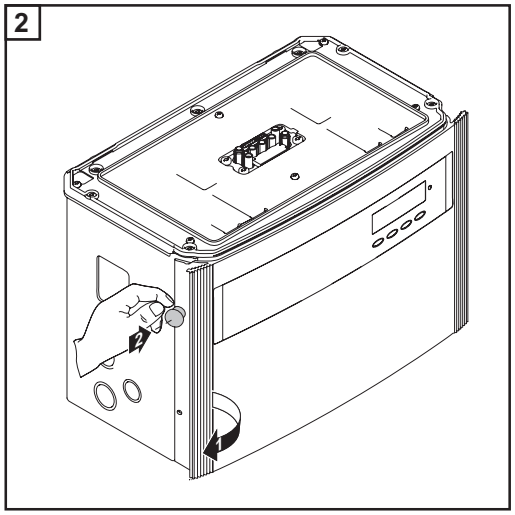
**Closing the inverter**

**IMPORTANT!** Secure newly-added option cards to the metal cover using the screws provided with the option cards.

1




2



# Data Communication and Solar Net

**Solar Net and data interface**

Fronius developed Solar Net to make these add-on system components flexible and capable of being used in a wide variety of different applications. Solar Net is a data network that enables several inverters to be linked with the system upgrades.

Solar Net is a bus system. A single cable is all that is required for one or more inverters to communicate with all system upgrade components.

The core of the Solar Net is the Fronius Datalogger. It coordinates data transmissions and ensures that even large volumes of data are distributed quickly and securely.

The 'Fronius Com Card' is used to integrate the inverter into Solar Net.

**Important** Every inverter that is to be monitored using a Datalogger requires a 'Fronius Com Card.' In this case, the 'Fronius Com Card' serves as a link between the internal network of the inverter and the Solar Net interface of the Datalogger.

**Important** Each inverter can have only one 'Fronius Com Card.' A network may only contain one Fronius Datalogger.

The first inverter with a 'Fronius Com Card' can be positioned up to 3280 ft. (1000 m) away from the last inverter with a 'Fronius Com Card.'

Different system upgrades are detected automatically by Solar Net.

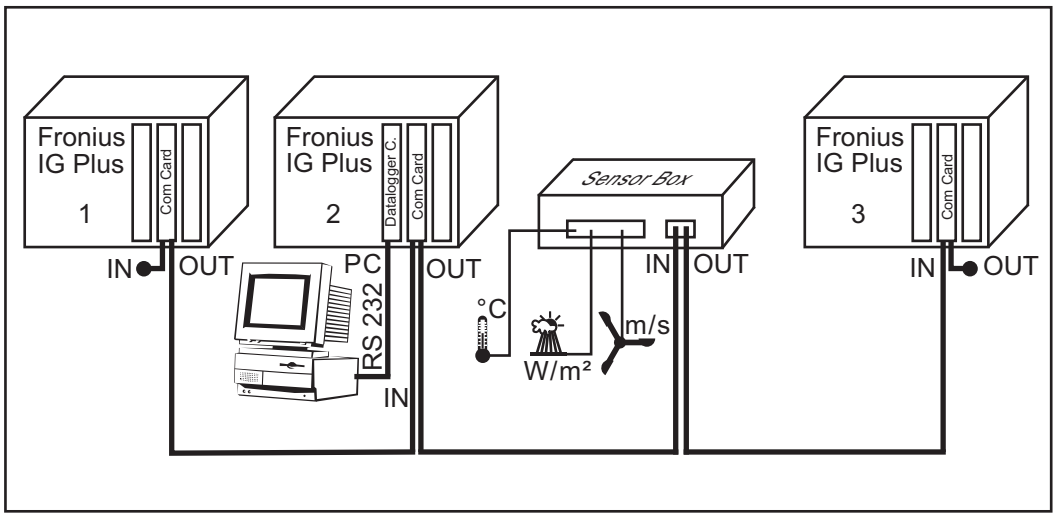
In order to distinguish among several identical system upgrades, each one must be assigned a unique number.

In order to uniquely identify each inverter in Solar Net, each inverter must also be assigned an individual number.
You can assign individual numbers as per 'The setup menu' section in this manual.

More detailed information on the individual system upgrades can be found in the relevant operating instructions or on the Internet at http:\\www.fronius-usa.com.

**Example**

Logging and archiving inverter and sensor data using a Fronius Datalogger and Fronius Sensor Box:




= Terminating plug

Illustration explanation: Data network with 3 Fronius IG Plus units and one Fronius Sensor Box:

- all Fronius IG Plus units have one 'Fronius COM Card'
- one Fronius IG Plus has a 'Fronius Datalogger Card' (no. 2)
- Fronius Datalogger has two RS-232 interfaces for connecting to a PC and a modem

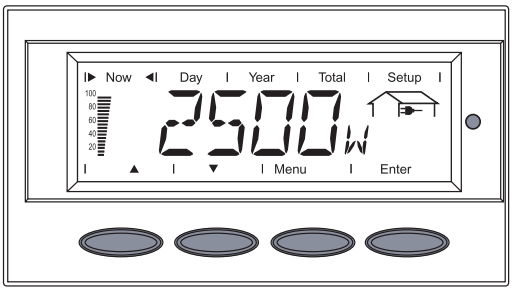
Option cards communicate within the Fronius IG Plus via its internal network. External communication (Solar Net) takes place via the 'Fronius Com Cards.' Each 'Fronius Com Card' is equipped with two RS485 interfaces - an input and an output. RJ45 plug connectors are used to connect to these cards.

# Selecting the interface protocol and setting the inverter baud rate

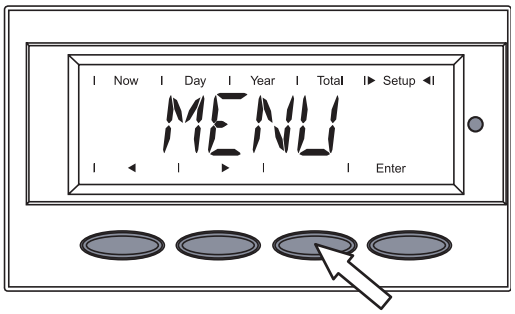
**General**

If a data communication connection is required between the inverter and other Fronius data communication components, the ‘Interface protocol’ must be set in the ‘Basic Service’ menu.
The following 5-digit access code must be entered to access the ‘Basic Service’ menu: 22742

**Entering the access code**



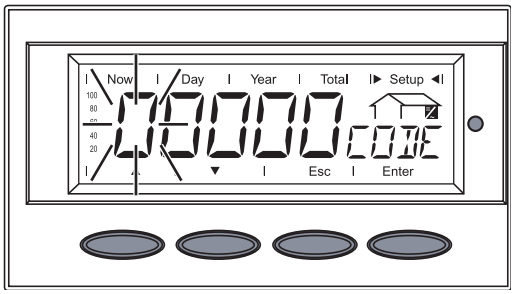

**1** Press the ‘Menu’ key




‘Menu’ is shown.

**2** Select the ‘Setup’ mode using the ‘Left’ or ‘Right’ keys
◀ ▶

**3** Press the unoccupied ‘Esc’ key 5 x

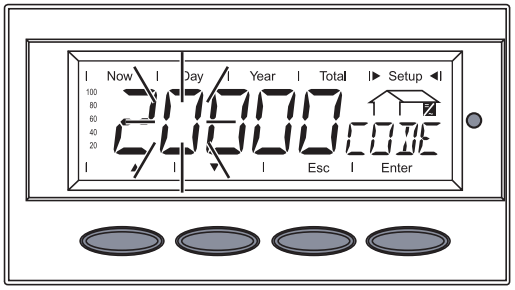



‘CODE’ is displayed, the first digit flashes.

**4** Enter the access code 22742:

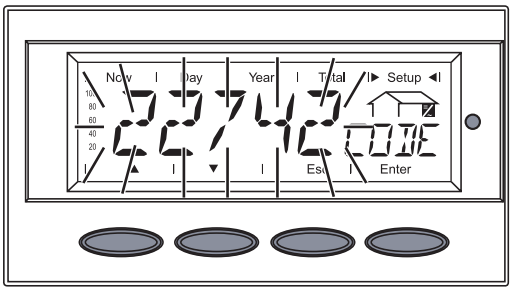
Use the ‘Up’ and ‘Down’ keys to select a value for the first digit of the access code
▲ ▼

**5** Press the ‘Enter’ key



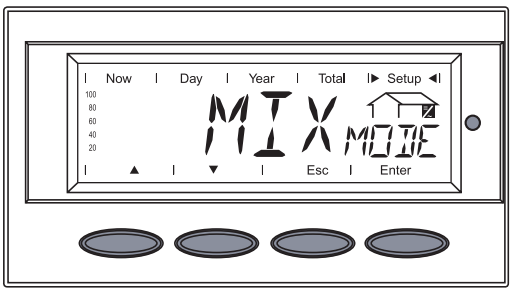

The second digit flashes.

**6** Repeat steps 4 and 5 for the second, third, fourth and fifth digit of the access code until ...



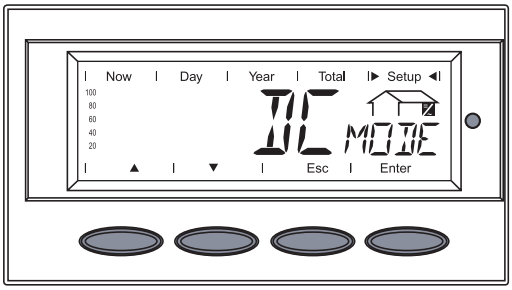

... the access code flashes.

14 Press the ‘Enter’ key



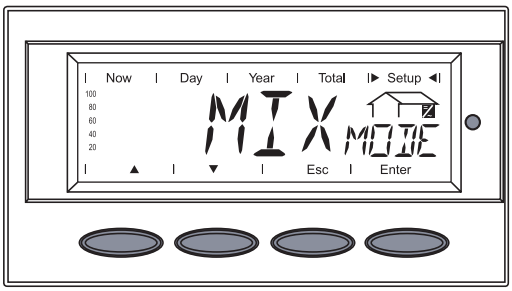

The inverter is now in the ‘Basic Service’ menu, the first parameter is displayed:

‘MIX MODE’ for multiphase inverters



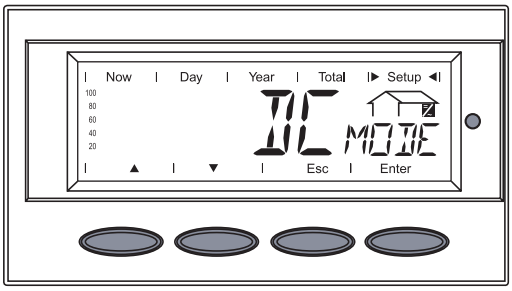

‘DC MODE’ for single-phase inverters

**Selecting the interface protocol for communication with other data communication components**

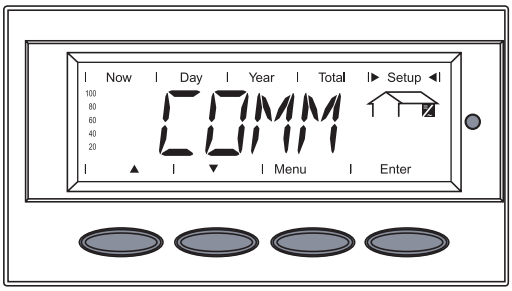



The inverter is in the ‘Basic Service’ menu, the first parameter is displayed:

‘MIX MODE’ for multiphase inverters



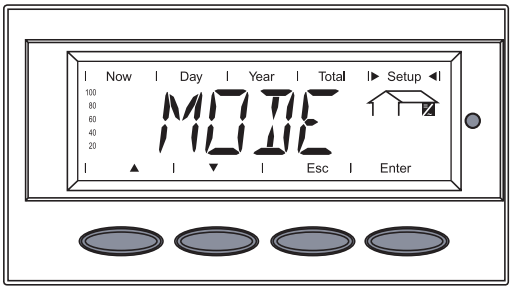

‘DC MODE’ for single-phase inverters




1 Use the ‘Up’ and ‘Down’ keys to select the ‘COMM’ parameter

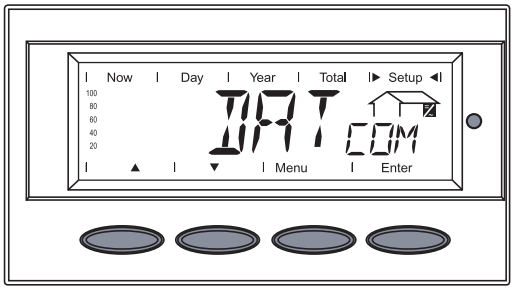
▲ ▼

2 Press the ‘Enter’ key

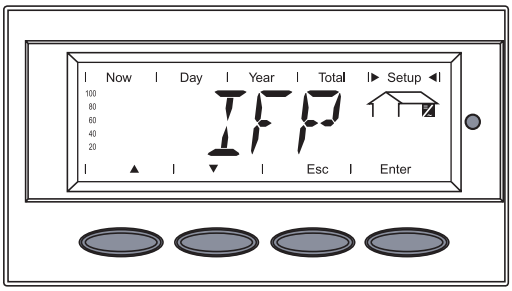



‘MODE’ is shown.

3 Press the ‘Enter’ key



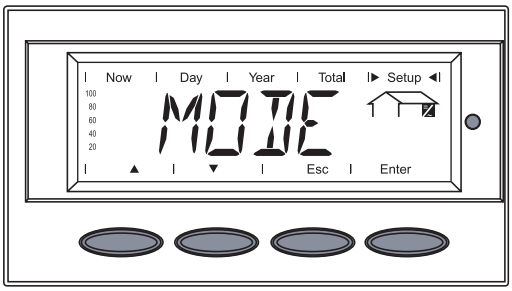

The set protocol type is displayed.




4 Use the ‘Up’ and ‘Down’ keys to select the ‘IFP’ protocol type (interface protocol):

▲ ▼

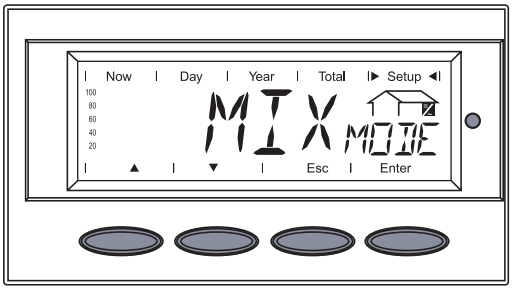
5 Press the ‘Enter’ key to apply the ‘IFP’ protocol type.




The ‘IFP’ protocol type is applied, ‘MODE’ is displayed.

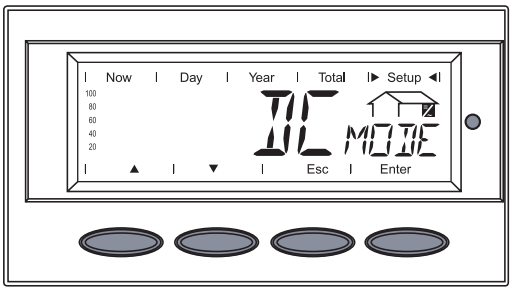
6 Press the ‘Esc’ key 2 x to exit the ‘Basic Service’ menu

**Setting the inverter baud rate**

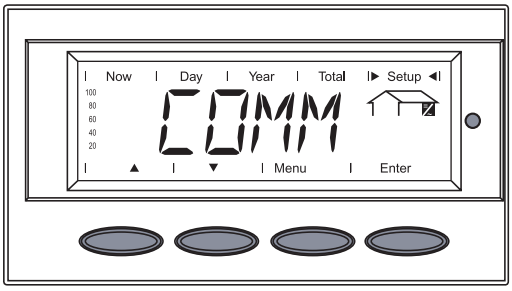



The inverter is in the ‘Basic Service’ menu, the first parameter is displayed:

‘MIX MODE’ for multiphase inverters

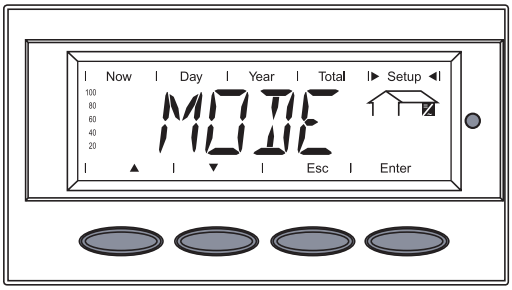



‘DC MODE’ for single-phase inverters

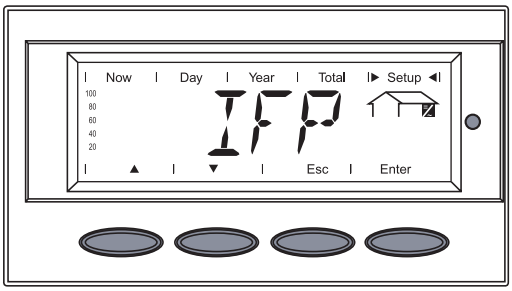



1 Use the ‘Up’ and ‘Down’ keys to select the ‘COMM’ parameter
▲ ▼

2 Press the ‘Enter’ key

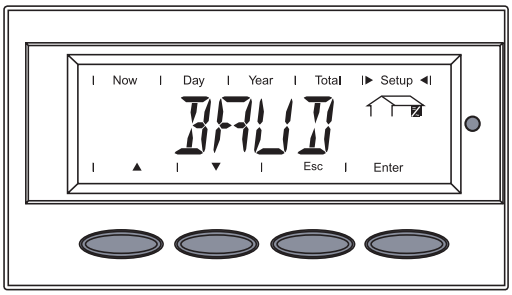



‘MODE’ is shown.



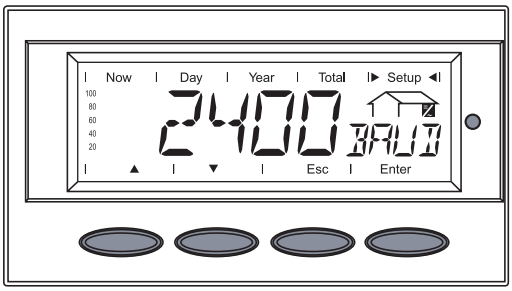

3 Use the ‘Up’ and ‘Down’ keys to select the ‘IFP’ parameter
▲ ▼

4 Press the ‘Enter’ key




‘BAUD’ is displayed

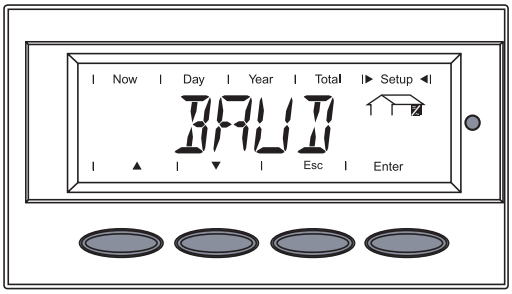
5 Press the ‘Enter’ key




The set baud rate is displayed.

6 Use the ‘Up’ and ‘Down’ keys to select the desired baud rate:
2400 / 4800 / 9600 / 14400 / 19200
▲ ▼

7 Press the ‘Enter’ key




The selected baud rate is applied, ‘BAUD’ is displayed.

8 Press the ‘Esc’ key 3 x to exit the ‘Basic Service’ menu

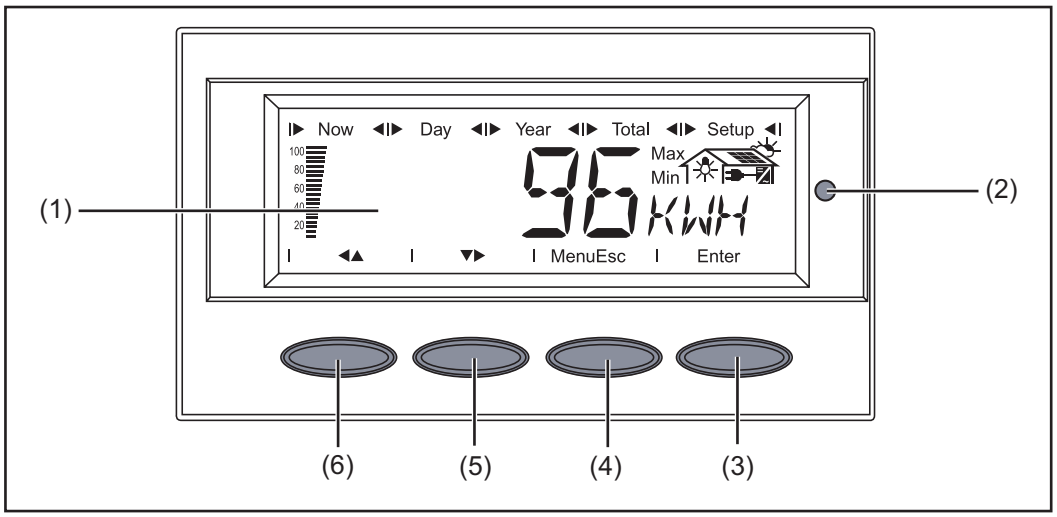
The inverter begins the startup phase after exiting the ‘Basic Service’ menu.

# Operation

# Product Description Fronius IG Plus

USA

**Controls and Indicators**

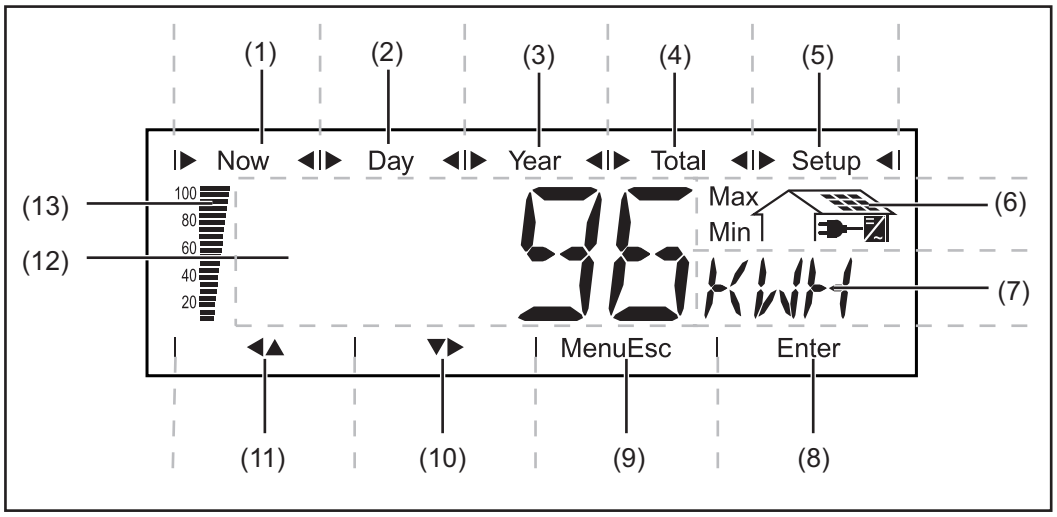



| Item | Function |
|---|---|
| **(1)** | Display<br>for displaying values, settings and menus |
| **(2)** | Operating Status LED<br>for displaying the operating status |
| **(3)** | "Enter" key<br>for confirming a selection |
| **(4)** | "Menu / Esc" key<br>for scrolling through menu options<br>for exiting the Setup menu |
| **(5)** | "Down/Right" key<br>depending on the selection:<br>for navigating down<br>for navigating right |
| **(6)** | "Left/Up" key<br>depending on the selection:<br>for navigating left<br>for navigating up |

**Display**

The display unit's power is supplied via the safety-low voltage of the solar modules, which means that the display unit can be used in the daytime.

**IMPORTANT!** The inverter display is not a calibrated measuring instrument. A slight inaccuracy of a few percent is intrinsic to the system. A calibrated meter will be needed to make calculations for the power supply company.




| Item | Function |
|---|---|
| **(1)** | Icons for the "Now" display mode |
| **(2)** | Icons for the "Day" display mode |
| **(3)** | Icons for the "Year" display mode |
| **(4)** | Icons for the "Total" display mode |
| **(5)** | Icons for the "Setup" display mode |
| **(6)** | Icons for operating conditions |

Max — The value shown represents the maximum value within the period of observation (depending on which display mode is selected).

Min — The value shown represents the minimum value within the period of observation (depending on which display mode is selected).

Important The minimum and maximum values displayed do not represent the absolute extreme values, because data is recorded only at two-second intervals.

... appears when values are displayed which are directly associated with the solar modules

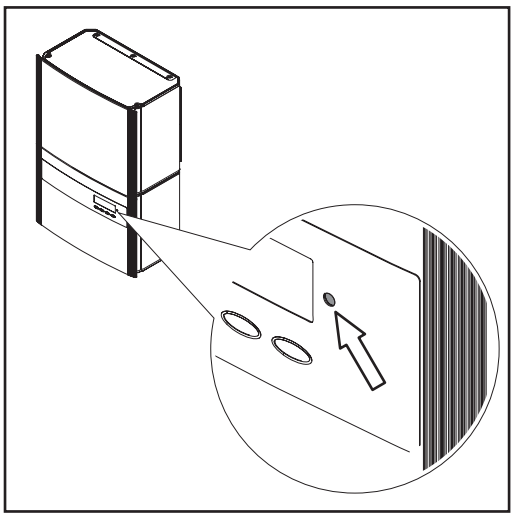
... appears when values are displayed which are directly associated with the public grid

... appears with data readings that are directly related to the inverter

| | |
|---|---|
| **(7)** | Range for display unit<br>for displaying the applicable measuring unit |
| **(8)** | Icon for the "Enter" key |
| **(9)** | Icons for the "Menu/Esc" key |
| **(10)** | Icons for the "Down/Right" key |
| **(11)** | Icons for the "Left/Up" key |
| **(12)** | Range for display value<br>for displaying the value |

| Item | Function |
|---|---|
| **(13)** | Output bar (not active during setup)<br>indicates the output power fed into the grid at a given moment - regardless of the display mode chosen. The screen displays % of the maximum possible output power of your solar inverter |

**Operating Status LED**



Position of Operating Status LED on the inverter

Depending on the operating status, the Operating Status LED assumes different colors:

| Operating Status LED | Explanation |
|---|---|
| Steady green | The LED stays lit after the automatic startup phase of the inverter as long as power is being fed into the grid.<br>It indicates problem-free operation of the photovoltaic system. |
| Flashing green | The photovoltaic system is working correctly, a status code is on the display.<br><br>When a status code is shown, rectify the relevant condition by going to the "Maintenance and Service" chapter, "Status Diagnosis and Troubleshooting" section. The status code can be acknowledged by pressing the "Enter" key. |
| Steady orange | The inverter enters an automatic startup phase as soon as the solar modules are delivering sufficient power after sunrise. |
| Flashes orange | A warning is shown on the display<br>or<br>the inverter has been set to standby operation in the Setup menu (= manual shutoff of operation).<br><br>The next day, operation will resume automatically.<br><br>During the time the LED flashes orange, operation can be resumed manually at any time (see section "The Setup Menu") |
| Steady red | General status: the respective status code is shown on the screen |
| Remains dark | There is no connection to the solar modules,<br>no solar module power due to darkness. |

A list of most status codes, the corresponding status information, their status causes and repair measures can be found in the chapter "Troubleshooting and Maintenance," section "Status Diagnosis and Troubleshooting."

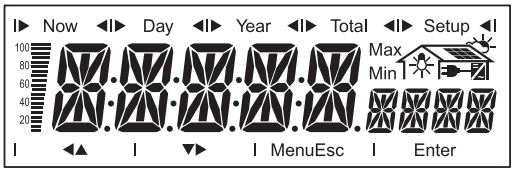
# Startup Phase and Grid Feed-in Mode

**Startup phase**

The inverter carries out a self test after being turned on automatically. Then a test of the public grid is carried out. This test takes five minutes. During the startup sequence the illumination of the Operating Status LED is yellow.

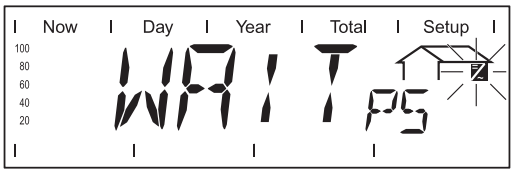
**Test procedure**

1. Segment test
   All display elements light up for about one second

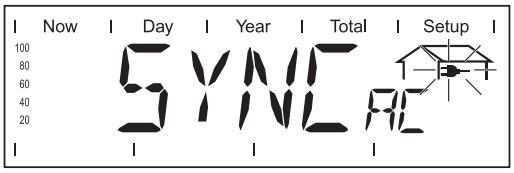



2. Self test of essential inverter components
   - The inverter goes through a master check list for several seconds
   - The display shows ‘TEST’ and indicates the respective component that is being tested (for example, ‘LED’)

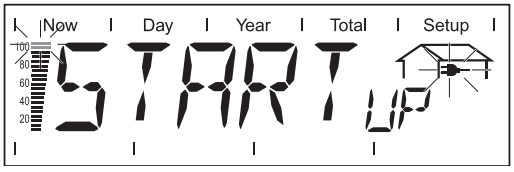
3. Synchronization with grid:
   - ‘WAIT PS’ is displayed, the inverter icon flashes: The inverter is waiting for all power stage sets in the network to be on stand-by. This procedure takes place dependent on the DC voltage




   - Next, the display shows ‘SYNC AC,’ the grid icon flashes.




4. Startup test
   - Before the inverter starts feeding energy into the grid, the conditions of the grid are tested in accordance with local regulations.
   - The display shows ‘START UP.’

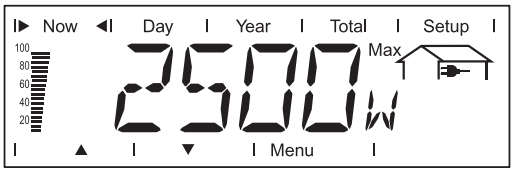


The startup test takes five minutes. The time elapsed is indicated by a bar shrinking from the top down.

Whenever two scale divisions stop flashing and disappear, 1/10 of the total duration of the test is over.

**Operation of Feeding Energy into the Grid**

- Once the tests have been completed, the inverter starts feeding power into the grid.
- The display shows the present power feeding into the grid.
- The Operating Status LED lights up green, and the inverter starts operating.



# Navigation in the Menu Level

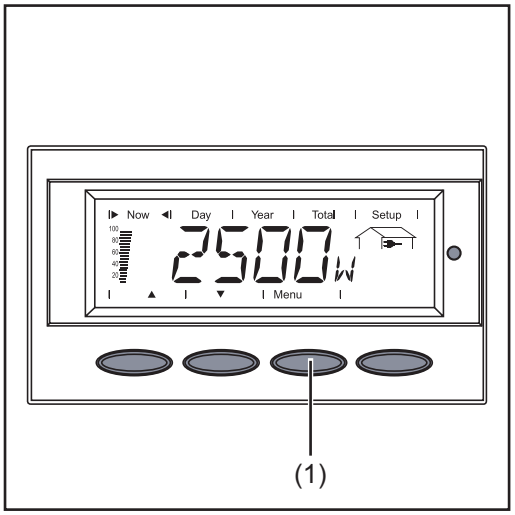
**Activating Display Illumination**

1 Press any key

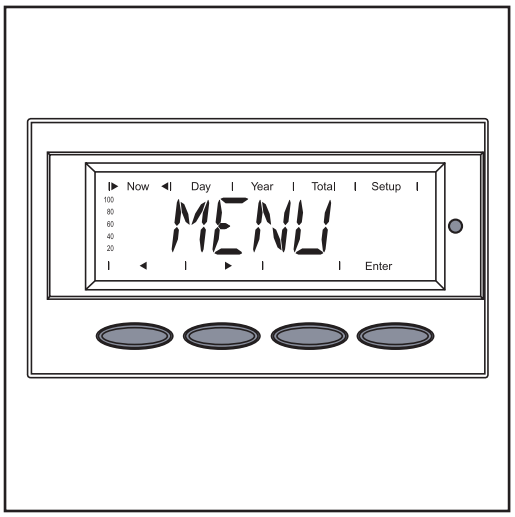
The display backlight is activated.

If no key is pressed for 30 seconds or more, the display backlight will go off again. The setup menu also offers a choice between a permanently lit or permanently dark display.

**Accessing the Menu Level**




1 Press the "Menu" key (1)




"Menu" will appear on the display

The inverter is now in the menu level.

From the menu level you can
- set the desired display mode
- access the Setup menu

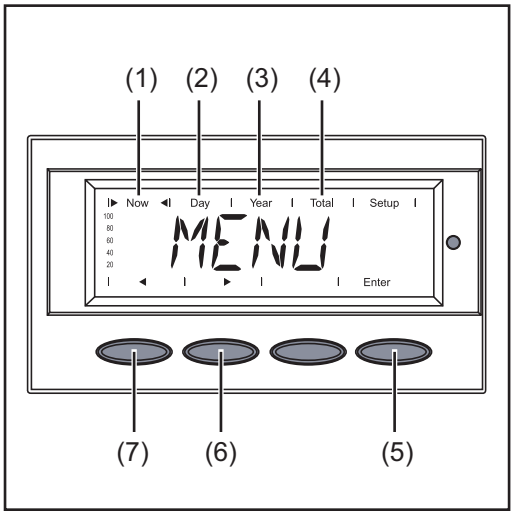
# The Display Modes

USA

**The Display Modes**

| | | |
|---|---|---|
| "Now" display mode | ..... | Displays real-time values |
| "Day" display mode | ..... | Displays values for power fed into the grid during that day |
| "Year" display mode | ..... | Displays values for the present calendar year - only available in combination with optional Fronius Datalogger |
| "Total" display mode | ..... | Displays values for power fed into the grid since the inverter was started for the first time |

**Selecting a Display Mode**

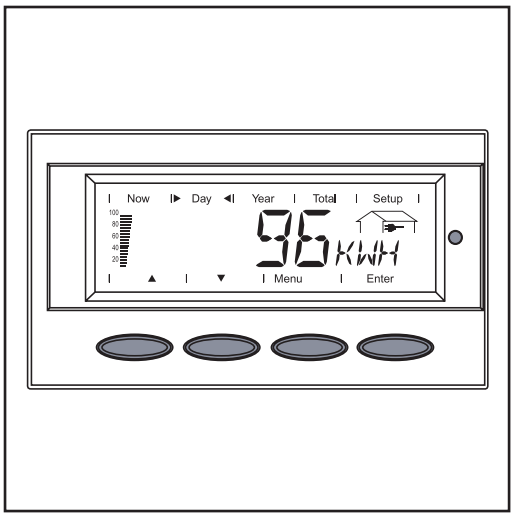



1 Accessing the menu level

2 Use the "left" (7) or "right" (6) keys to select your preferred display mode (1) - (4)

◀ ▶

3 Press "Enter" (5)




The selected display mode is shown, e.g., "Day" display mode.

**IMPORTANT!** The "Year" menu option is supported only when the optional Fronius Datalogger is connected. This system upgrade includes a real-time clock.

**Overview of Display Values**

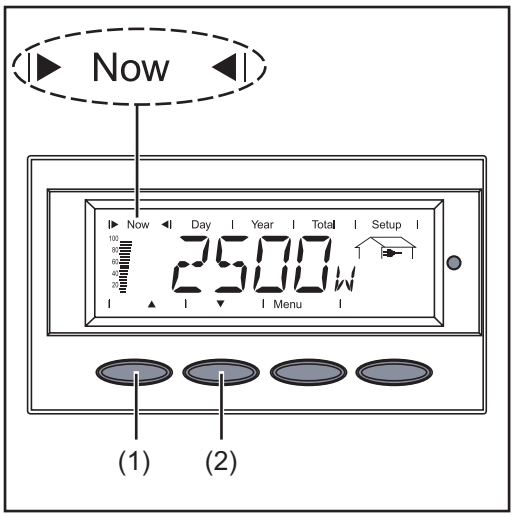
| Display mode | Symbol | Unit | Optional | Display value |
|---|---|---|---|---|
| "Now" | | W | - | Output power |
| | | V | - | Grid voltage |
| | | A | - | Output current |
| | | Hz | - | Grid frequency |
| | | V | - | Solar module voltage |
| | | A | - | Solar module current |
| | | Mohm | - | Insulation resistance |
| | | HH:MM | x | Time |
| "Day" | | kWh / MWh | - | Energy fed into the grid |
| "Year" | | Currency | - | Return |
| "Total" | | kg / T | - | $CO_2$ reduction |
| | | W | - | Max. output power |
| | | V | - | Maximum grid voltage |
| | | V | - | Minimum grid voltage |
| | | V | - | Maximum array voltage |
| | | HH:MM | - | Service hours completed by the inverter |

x Optional
If the DatCom component for the required options are not available, the message "N.A." (not available) is shown.

# Display Values in "Now" Display Mode

USA

**Selecting the "Now" Display Mode**



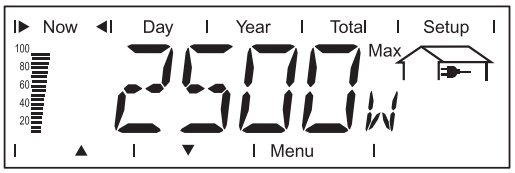

1 Select the "Now" display mode

The first display value in the "Now" display mode appears

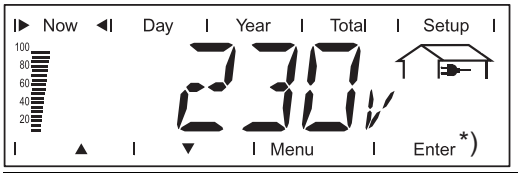
2 Use the "Down" (2) key to scroll to the next display value

Scroll back using the "Up" key (1)

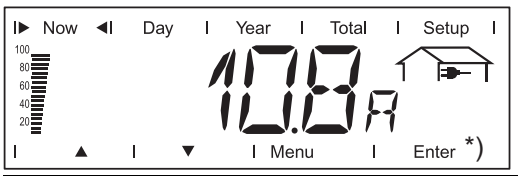
**Display values in the 'Now' display mode**




**Output power**
power supplied to grid at the particular moment (watts)

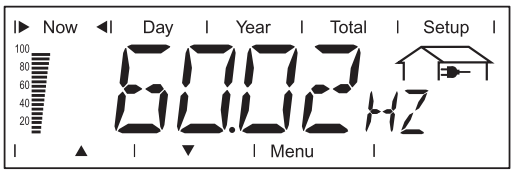



**AC grid voltage**
(volts)

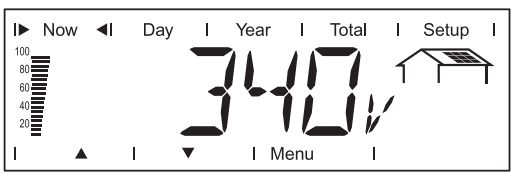



**Output current**
current supplied to the grid at the particular moment (amperes)

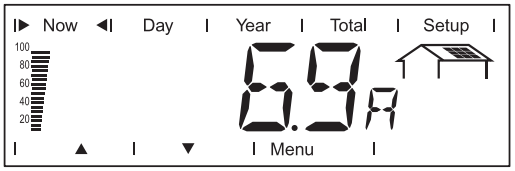
*) only for multi-phase inverters



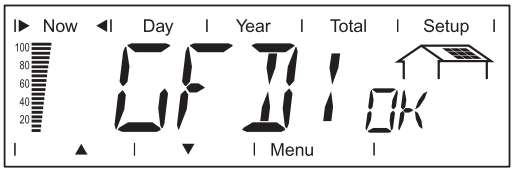

**Grid frequency**
(hertz)



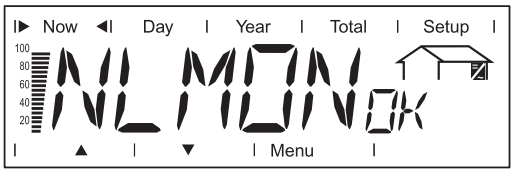

**Solar module voltage**
voltage of the solar array at the particular moment (volts)



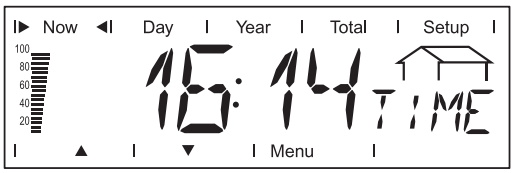

**Solar module current**
current supplied by solar array at the particular moment (amperes)




**GFDI status**
If there is no ground fault in the system, ‘GFDI OK’ is displayed




**NL-MON communication**
When there is communication with the ‘NL-MON’ plug-in card, ‘NLMON OK’ is displayed




**Time (optional datalogger)**
When the time on the inverter or a system upgrade is changed, this changes the time on all devices connected via Solar Net.

**Options**

If the DatCom component for the required options are not available, the message "N.A." (not available) is shown.

# Display Values in "Day / Year / Total" Display Modes

USA

**General**

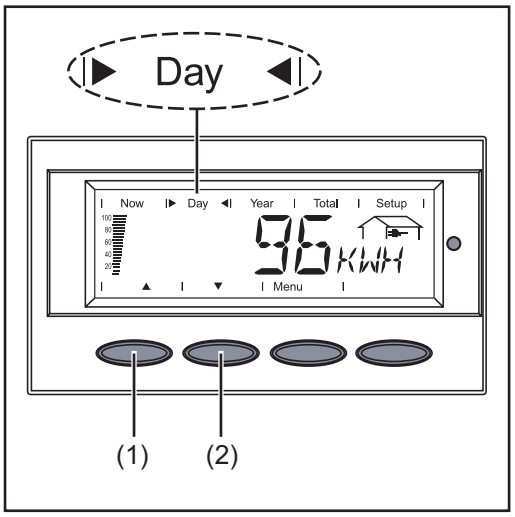
For the Fronius IG Plus unit, the day begins when it switches on. If the DC supply line is disconnected, the following parameters within the display mode 'Day' will be reset after repeating the start-up:

- yield (currency can be selected)
- $CO_2$ reduction (lbs.)
- maximum power supplied (Watts)
- maximum grid voltage (Volts)
- minimum grid voltage (Volts)
- operating hours for Fronius IG Plus unit

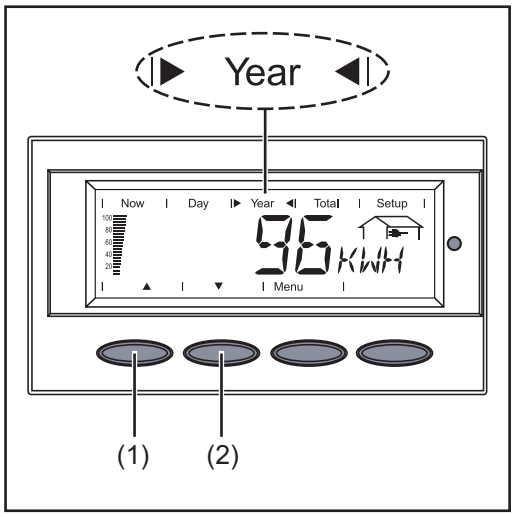
If an optional datalogger is available, the display values listed always apply for the whole day.

**Selecting "Day / Year / Total" Display Mode**

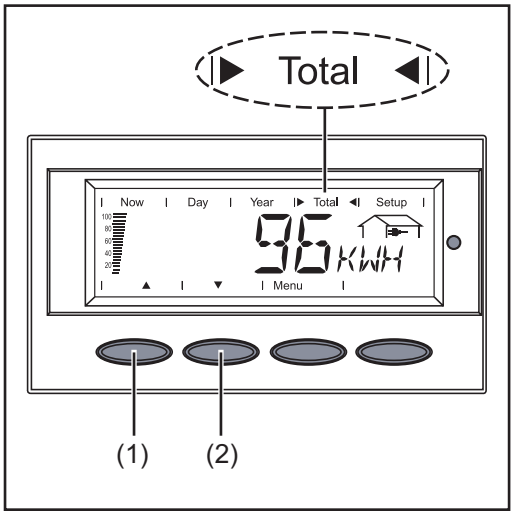
First Display Value in the "Day" Display Mode:




First Display Value in the "Year" Display Mode:



First Display Value in the "Total" Display Mode:



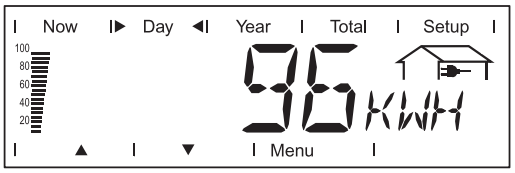

1 Select the "Day" or "Year" or "Total" display mode

The first display value in the selected display mode appears.

2 Use the "Down" (2) key to scroll to the next display value

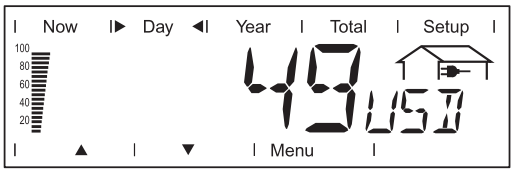
Scroll back using the "Up" key (1)

**Display values in the 'Day / Year / Total' display modes**




**Output energy**
energy supplied during the monitored period (kWh / MWh)

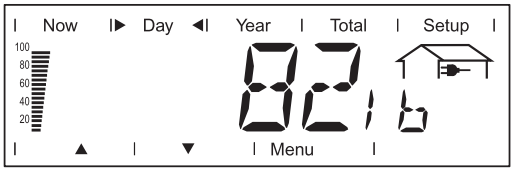
Due to the variety of different monitoring systems, there can be deviations between the readings of other metering instruments as compared to the readings from the inverter. For determining the energy supplied to the grid, only the readings of the calibrated meter supplied by the electric utility company are relevant.

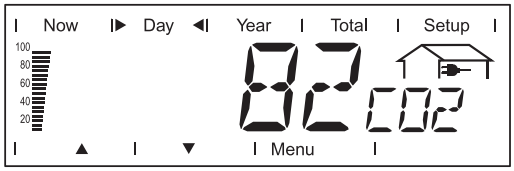



**Yield**
money earned during the monitored period (set currency and price per kWh in setup menu)

As was the case for the output energy, readings may differ from those of other instruments.

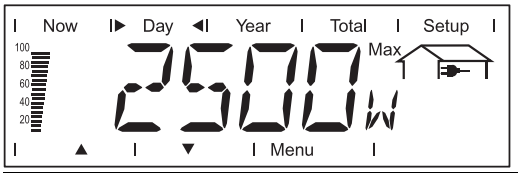
'The Setup Menu' section describes how to set the currency and rate for the energy supplied. The factory setting depends on the respective country-specific setting.



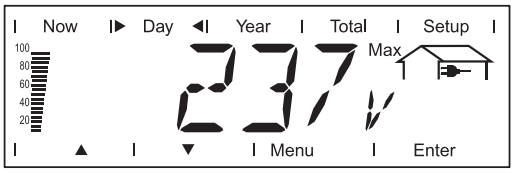




**CO2 reduction**
CO2 emissions saved during the monitored period
(lb / T; T = tons)
The area for unit display switches between ‘lb’ or ‘T’ and ‘CO2.’

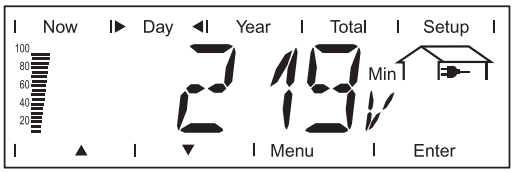
The CO2 meter gives an indication of CO2 emissions that would be released during the generation of the same amount of electricity in a combustion power plant.
This factory setting for this is 1.3 lb/kWh.



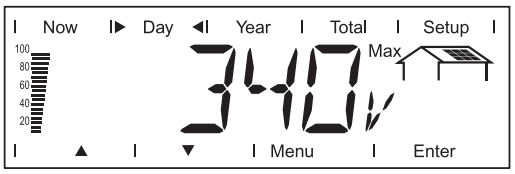

**Maximum output power**
highest output power during the observation period (watts)



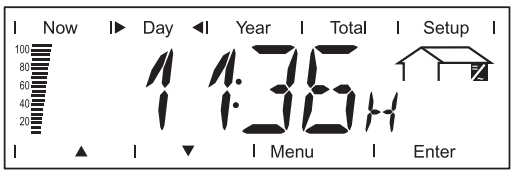

**Maximum grid voltage**
highest reading of grid voltage (V) during the observation period




**Minimum grid voltage**
lowest reading of grid voltage (V) during the observation period




**Maximum solar module voltage**
highest reading of solar module voltage (V) during the observation period




**Operating hours**
indicates how long the inverter has been operating
(HH:MM)

Duration of operation is shown in hours and minutes up to 999 h and 59 min (display: ‘999:59’). After that only full hours are displayed.

Although the inverter does not operate during the night, all sensor data are recorded around the clock.

**Options**

If the DatCom component for the required options are not available, the message "N.A." (not available) is shown.

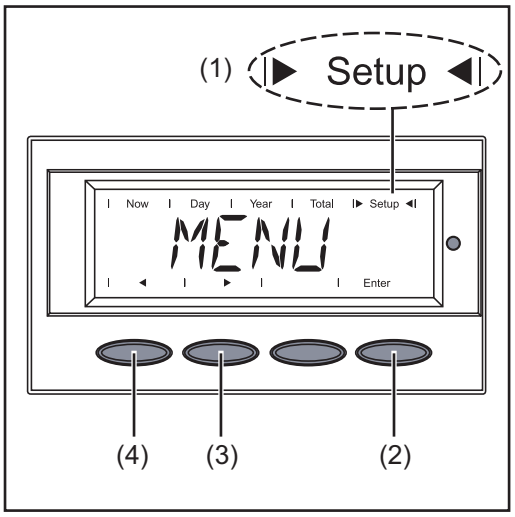
# The Setup Menu

**Presetting**

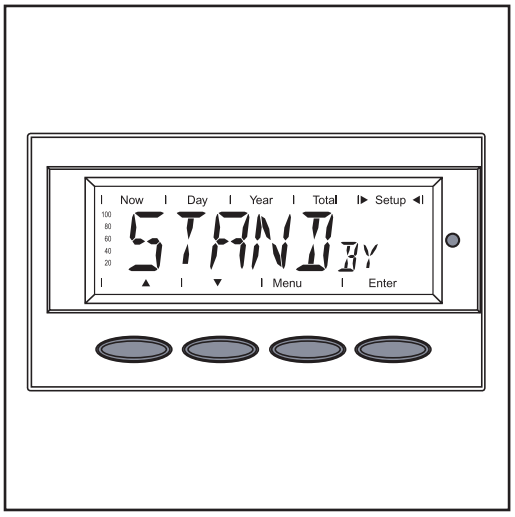
The inverter is pre-configured and ready to use. No manual control is necessary for feeding the power it generates into the grid.

The setup menu allows easy readjustment of the inverter's preset parameters to your needs.

**Accessing the Setup Menu**



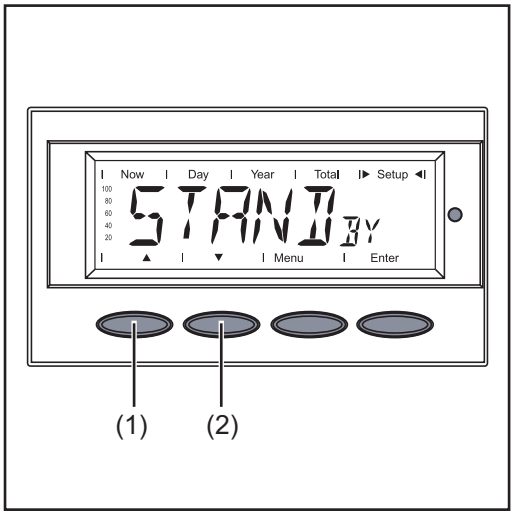

1. Switch to the menu level (press the "Menu" key)
2. Select the "Setup" (1) mode using the "Left" (4) or "Right" (3) keys
3. Press "Enter" (2)



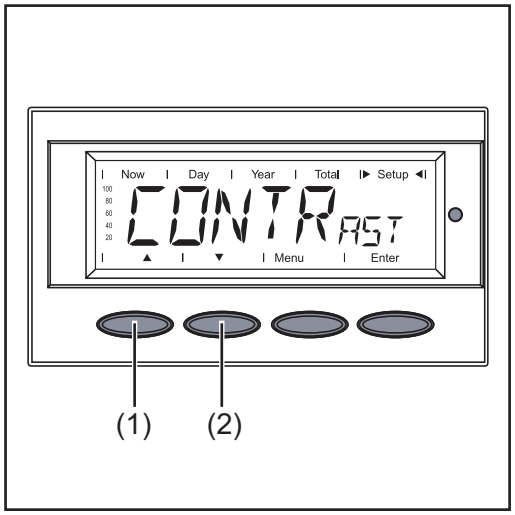

The Setup Menu's first menu item "STAND-BY" is shown.

**Scrolling through Menu Items**

Example: "STANDBY" menu item




Example: "CONTRAST" menu item

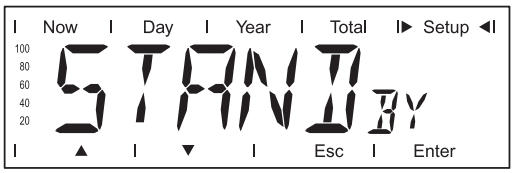



1 Access the Setup menu

2 Scroll through the available menu items using the "Up" (1) and "Down" (2) keys

# Menu Items in the Setup Menu

**STANDBY**

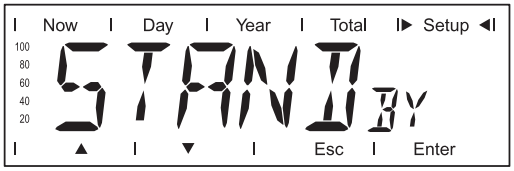


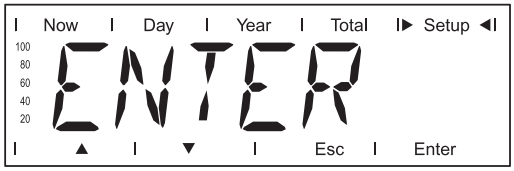

Manual activation / deactivation of Standby operation using the "Enter" key

| | |
|---|---|
| Unit | - |
| Setting range | Enter |
| Factory setting | Automatic operation of feeding energy into the grid (Standby deactivated) |

- The power electronics are switched off in standby mode. No power is fed into the grid.
- The Operating Status LED flashes orange.
- The orange flashing Operating Status LED stops at dusk.
- After the subsequent sunrise, the power supply operation into the grid is resumed automatically (after completion of the startup phase the LED is illuminated green).
- Grid supply operation can be resumed at any time whenever the LED is flashing orange (deactivate "STANDBY").

If the Standby mode is activated by pressing the "Enter" key, the display alternates between "STANDBY" and "Enter:"

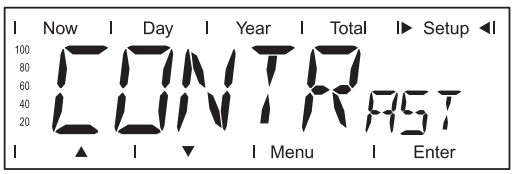



To maintain Standby operation:
- Press the "Esc" key

To end Standby operation:
- Press the "Enter" key

**CONTRAST**

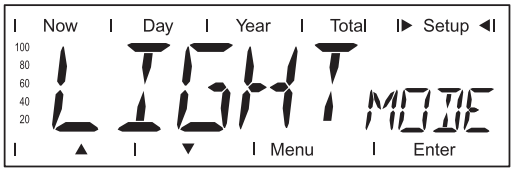



Contrast setting on LCD display

| | |
|---|---|
| Unit | - |
| Setting range | 0 - 7 |
| Factory setting | 7 |

Since contrast depends on temperature, it may be necessary to adjust the "CONTRAST" menu item when ambient conditions change.

**LIGHT MODE**



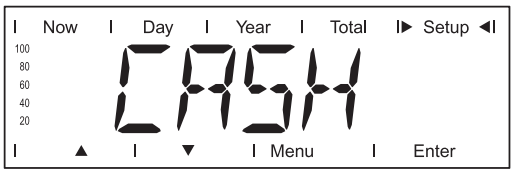

Initial setting for display illumination.

| | |
|---|---|
| Unit | - |
| Setting range | AUTO / ON / OFF |
| Factory setting | AUTO |

| | |
|---|---|
| AUTO: | The display illumination will stop 30 seconds after the last time a key has been pressed. |
| ON: | The display will remain illuminated whenever power is supplied to the grid. |
| OFF: | The display illumination will be permanently off. |

**IMPORTANT!** The "LIGHT MODE" setting only relates to the display's background illumination. The LCD display will still remain on during operation. Its energy consumption is less than one mW (1/1000 W).

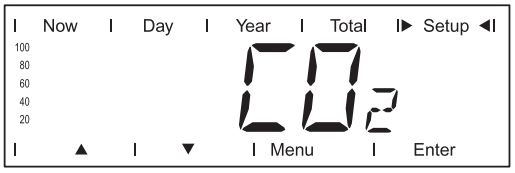
**CASH**




Setting of currency and rate for invoicing the energy supplied

| | |
|---|---|
| Unit | - |
| Display area | Currency / Charge rate/kWh |
| Factory setting | USD |

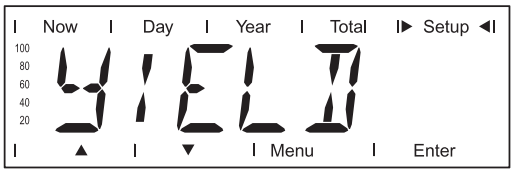
**CO2**




Setting of CO2 reduction factor

| | |
|---|---|
| Unit | lb/kWh, T/kWh |
| Setting range | 00,01 - 99,99 |
| Factory setting | 1.3 |

**YIELD**




Setting
- an OFFSET value for the total energy display
- a measurement correction value for the Day, Year and Total energy display

| | |
|---|---|
| Setting range | OFF SET / CALI. |

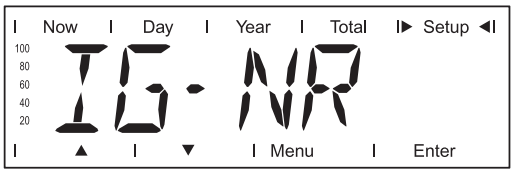
**OFF SET**
Preset value for the output energy, added to the actual output energy (e.g., transfer value upon replacement of the inverter) and the SI prefix

| | |
|---|---|
| Unit | Wh / kWh / MWh |
| Setting range | 5-digit + k... / M...<br><br>1 kWh = 1000 Wh<br>1 MWh = 1000000 Wh |
| Factory setting | 0 |

**CALI.**
Preset correction value, so that the data shown on the inverter display corresponds to the calibrated data shown on the electric meter

| | |
|---|---|
| Unit | % |
| Setting range | -5.0 - +5.0 in increments of 0.1 |
| Factory setting | 0 |

**IG no.**

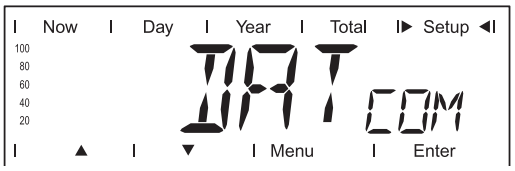



Number setting (address) of the inverter in a setup comprising multiple solar inverters linked together

| | |
|---|---|
| Unit | - |
| Setting range | 01 - 99 (100th inverter = 00) |
| Factory setting | 1 |

**IMPORTANT!** Each inverter must be assigned its own address when connecting several inverters in a data communications system.

**DAT COM**




Indicates status of data transmission, resets the Personal Display Card and Interface Card

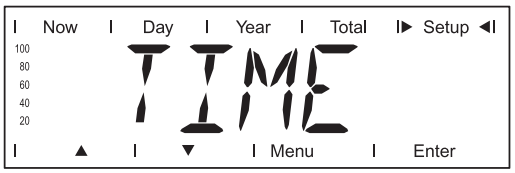
| | |
|---|---|
| Setting range | Displays OK COM or ERROR COM;<br>PDCD RST / IFCD RST |

**OK COM / ERROR COM**
Displays data communication available via Solar Net or an error that occurred in data communication

**PDCD RST**
Resets the Fronius Personal Display Card option

**IFCD RST**
Resets the Fronius Interface Card option

**TIME**

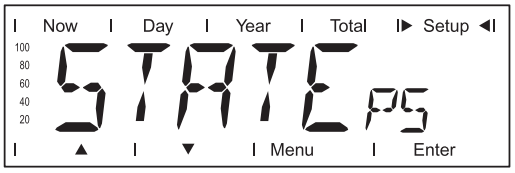



Date and time setting

| | |
|---|---|
| Unit | DDMMYYYY, HH:MM |
| Setting range | Date / Time |
| Factory setting | - |

**IMPORTANT!** The "TIME" menu item is only supported when the Fronius Datalogger option is installed.

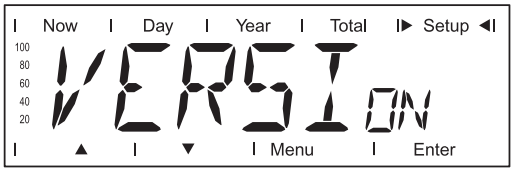
**STATE PS**




Status display of power stage sets; the last error that has occurred can be displayed

**IMPORTANT!** Due to the low level of irradiance early in the morning and in the evening, the status codes 306 (power low) and 307 (DC low) are displayed routinely at these times of day. These status messages do not indicate any kind of fault.

**VERSION**




displays the version number and serial number of the electronic components (e.g., IG Brain, power stage sets, display, country setup)

| | |
|---|---|
| Unit | - |
| Display area | MAIN CTRL / LCD / PS (PS00, PS01, PS02) / SETUP |
| Factory setting | - |

| | |
|---|---|
| MAINCTRL | Version information of the IG Brain unit (inverter controller) |
| LCD | Version information of the display |
| PS | Version information of the power stage sets (PS00 - max. PS02) |
| SETUP | Display of the currently set country setup<br>You can display the current country setup (2 - 3 letters) by pressing the ‘Enter’ key, e.g., ‘US’ for USA country setup;<br>You can exit the country setup display by pressing ‘Esc’ |

# Setting and Displaying Menu Items

USA

**Setting Menu Items - General**

1 Access the Setup menu

2 Use the "Up" or "Down" keys to select the desired menu item
▲ ▼

3 Press the "Enter" key

**The first digit of a value to be set flashes:**

4 Use the "Up" and "Down" keys to select a value for the first digit
▲ ▼

5 Press the "Enter" key

The second digit of the value flashes.

6 Repeat steps 4 and 5 until ...

the entire value flashes.

7 Press the "Enter" key

8 Repeat steps 4 - 6 for units or other values to be set until the unit or value flashes.

9 Press the "Enter" key to save and apply the changes.

Press the "Esc" key to not save the changes.

The currently selected menu item is displayed.

**The available settings are displayed:**

4 Use the "Up" and "Down" keys to select the desired setting
▲ ▼

5 Press the "Enter" key to save and apply the selection.

Press the "Esc" key to not save the selection.

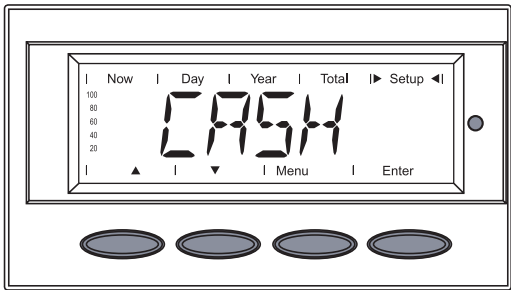
The currently selected menu item is displayed.

**Examples of Setting and Displaying Menu Items**

The following examples describe how to set and display menu items:

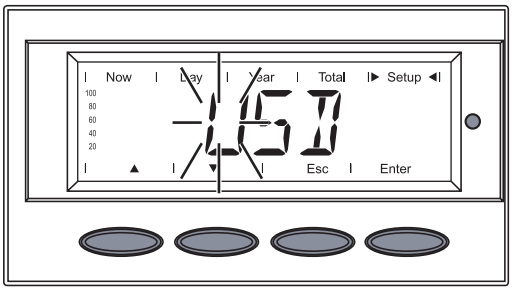
- Setting the Currency and Charge Rate
- Displaying and Setting Parameters in the "DATCOM" Menu Item
- Setting Time and Date

**Setting the currency and rate**




1 Select the ‘CASH’ menu item

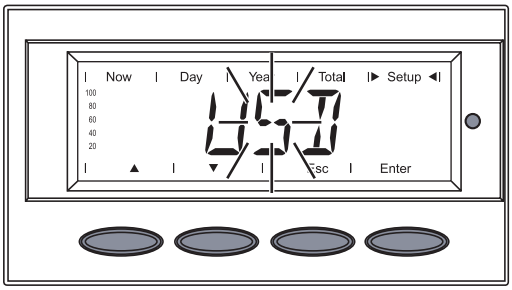
2 Press the ‘Enter’ key




The currency is display, factory setting = ‘USD’;
The first character flashes.

3 Use the ‘Up’ and ‘Down’ keys to select a letter for the first character
▲ ▼

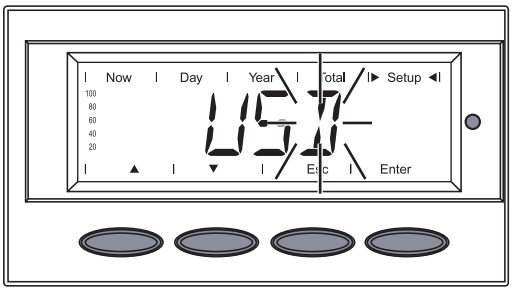
4 Press the ‘Enter’ key




The second character flashes.

5 Use the ‘Up’ and ‘Down’ keys to select
▲ ▼
a letter for the second character

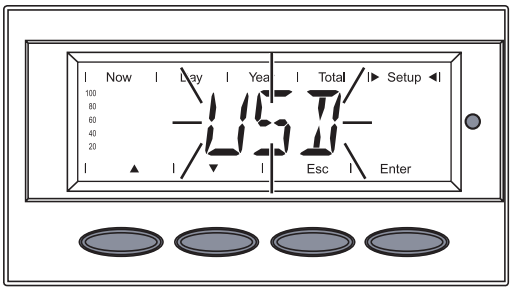
6 Press the ‘Enter’ key




The third character flashes.

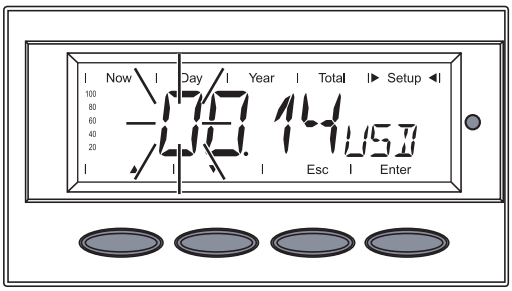
7 Use the ‘Up’ and ‘Down’ keys to select a letter for the third character
▲ ▼

8 Press the ‘Enter’ key




The set currency flashes.

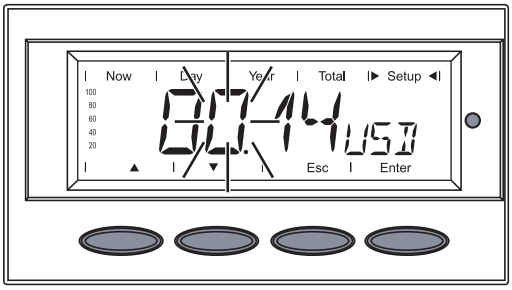
9 Press the ‘Enter’ key




The rate for energy supplied is now displayed in kWh / currency, factory setting = 0.14 USD / kWh;
The first digit flashes.

10 Use the ‘Up’ and ‘Down’ keys to select a value for the first digit (e.g., 0)
▲ ▼

11 Press the ‘Enter’ key

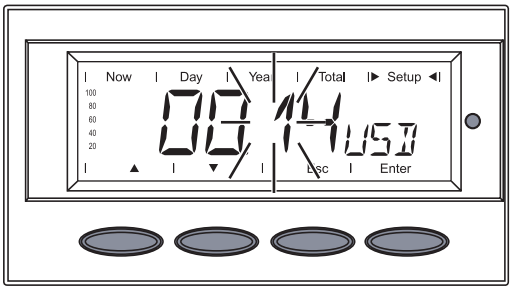



The second digit flashes.

12 Use the ‘Up’ and ‘Down’ keys to select a value for the second digit (e.g., 0)

▲ ▼

13 Press the ‘Enter’ key

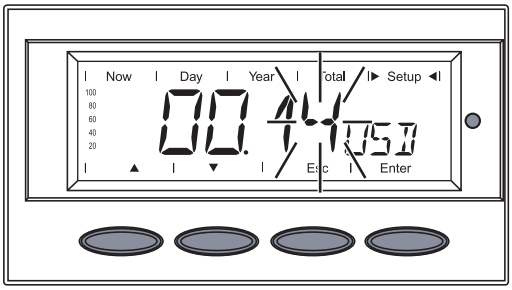



The first digit after the decimal point flashes.

14 Use the ‘Up’ and ‘Down’ keys to select a value for the first digit after the decimal point (e.g., 4)

▲ ▼

15 Press the ‘Enter’ key



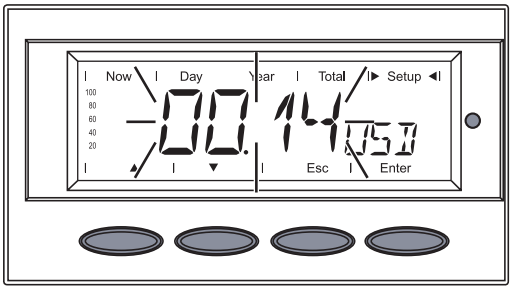

The second digit after the decimal point flashes.

16 Use the ‘Up’ and ‘Down’ keys to select a value for the second digit after the decimal point (e.g., 8)

▲ ▼

The values that can be set range from 00.01 to 99.99.

17 Press the ‘Enter’ key



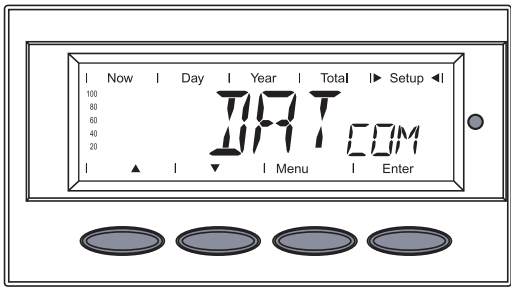

The set rate for energy supplied flashes.

18 Press the ‘Enter’ key

The currency and the rate for supplied energy are now accepted.

19 Press the ‘Esc’ key to exit the ‘CASH’ menu item

**Displaying and Setting Parameters in the "DATCOM" Menu Item**



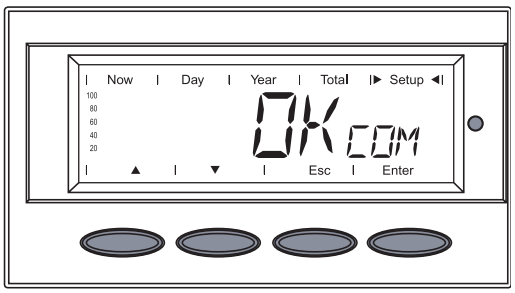

1 Select menu item ‘DATCOM’

2 Press the ‘Enter’ key

The following displays depend on whether

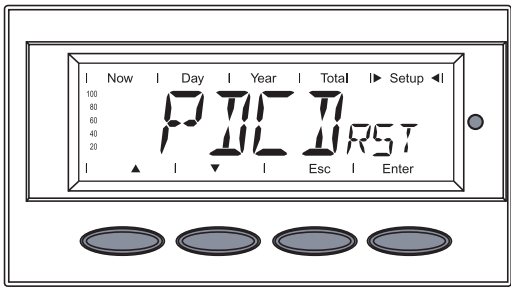
- a data connection is available
- a data connection is faulty or an option is not installed

**Available data connection**

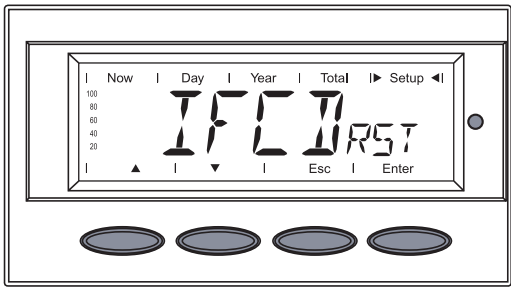



If there is a data connection available, ‘OK-COM’ is shown.

3 Use the ‘Down’ key to select available data:
▼

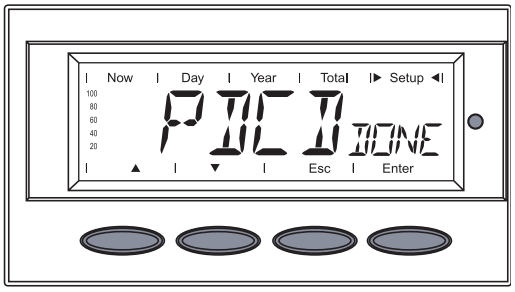



e.g. Reset Personal Display Card (‘PD-CDRST’) ...




... or Reset Interface Card (‘IFCDRST’)

4 Press the ‘Enter’ key



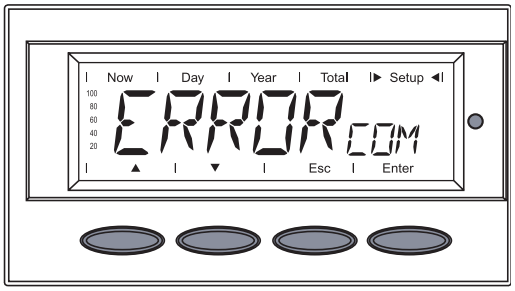

‘PDCD DONE‘...

...or...

‘IFCDDONE’ is shown

5 Press the ‘Esc’ key 2x to exit menu item ‘DATCOM’

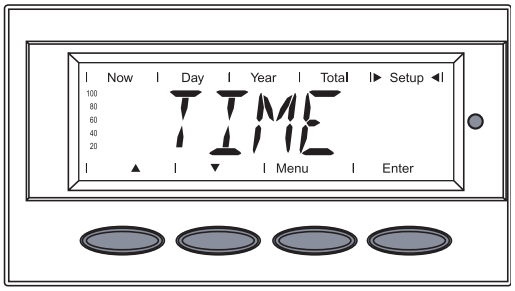
**Data connection faulty or an option is not installed**




If there is a faulty data connection or options are not installed ‘ERRORCOM’ is shown.

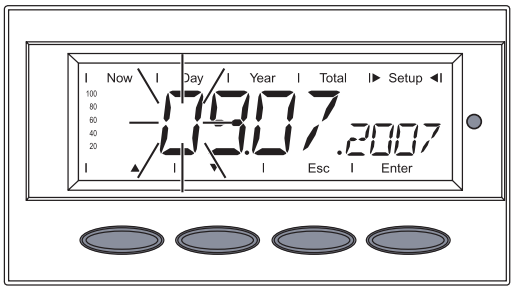
3 Press the ‘Esc’ key to exit menu item ‘DATCOM’

## Setting Time and Date




1 Select the "TIME" menu item

2 Press the "Enter" key

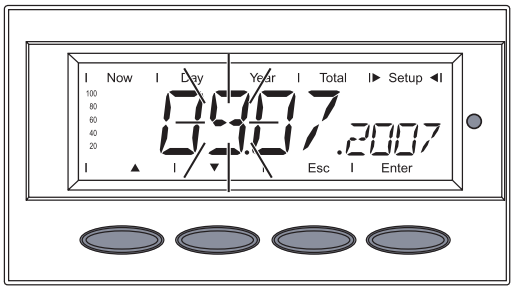



The **date** is displayed (DD.MM.YYYY), the first digit for the day flashes.

3 Use the "Up" and "Down" keys to select a value for the first day digit

▲ ▼

4 Press the "Enter" key

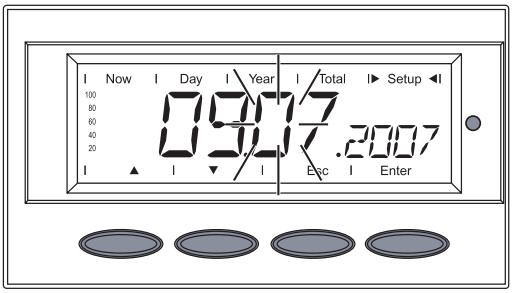



The second digit for the day flashes.

5 Use the "Up" and "Down" keys to select a value for the second day digit

▲ ▼

6 Press the "Enter" key

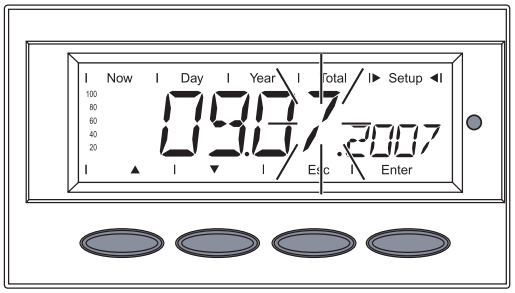



The first digit for the month flashes.

7 Use the "Up" and "Down" keys to select a value for the first month digit

▲ ▼

8 Press the "Enter" key

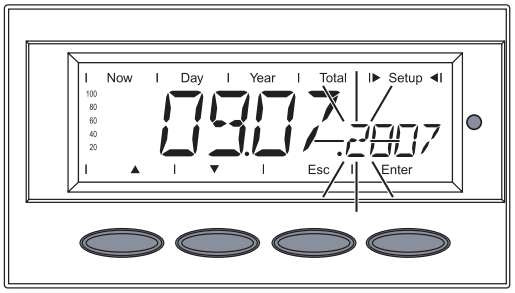



The second digit for the month flashes.

9 Use the "Up" and "Down" keys to select a value for the second month digit

▲ ▼

10 Press the "Enter" key

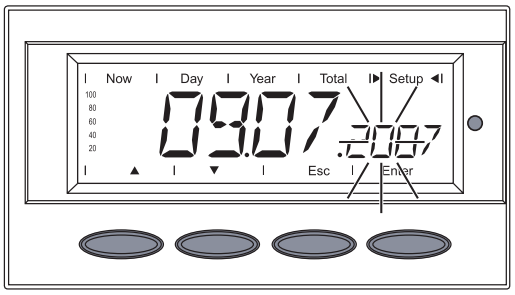



The first digit for the year flashes.

11 Use the "Up" and "Down" keys to select a value for the first year digit

▲ ▼

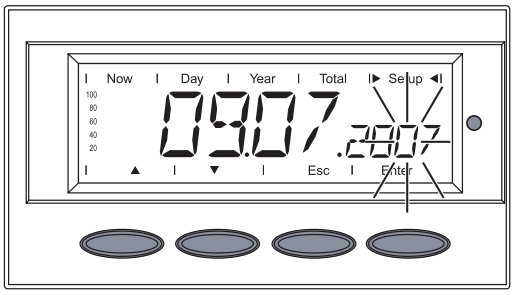
12 Press the "Enter" key




The second digit for the year flashes.

13 Use the "Up" and "Down" keys to select a value for the second year digit ▲ ▼

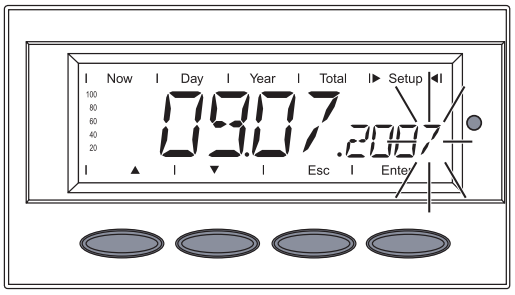
14 Press the "Enter" key




The third digit for the year flashes.

15 Use the "Up" and "Down" keys to select a value for the third year digit ▲ ▼

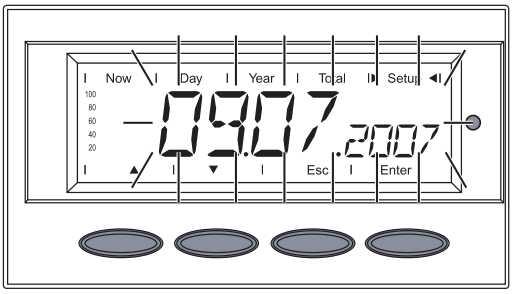
16 Press the "Enter" key




The fourth digit for the year flashes.

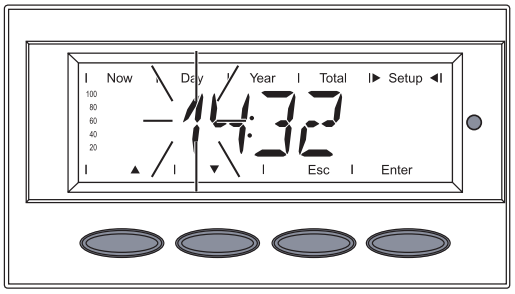
17 Use the "Up" and "Down" keys to select a value for the fourth year digit ▲ ▼

18 Press the "Enter" key




The set date then flashes.

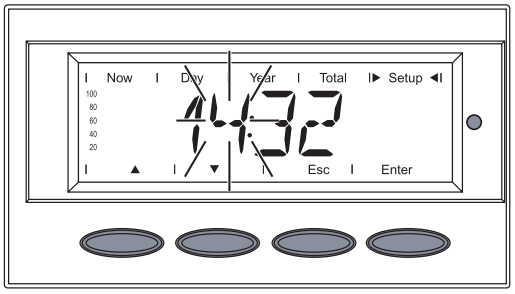
19 Press the "Enter" key




The **time** is displayed (HH:MM), the first digit for the hour flashes.

20 Use the "Up" and "Down" keys to select a value for the first hour digit ▲ ▼

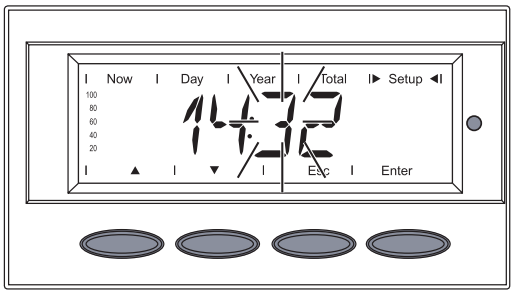
21 Press the "Enter" key




The second digit for the hour flashes.

22 Use the "Up" and "Down" keys to select a value for the second hour digit ▲ ▼

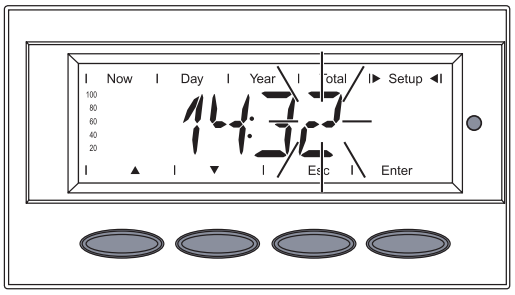
23 Press the "Enter" key




The first digit for the minutes flashes.

24 Use the "Up" and "Down" keys to select a value for the first minutes digit
▲ ▼

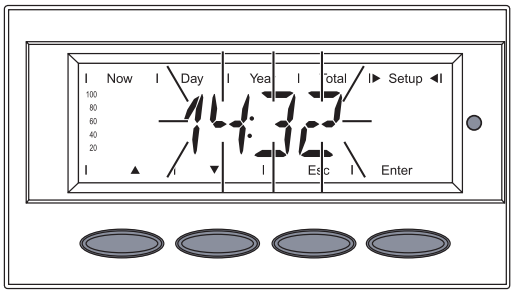
25 Press the "Enter" key




The second digit for the minutes flashes.

26 Use the "Up" and "Down" keys to select a value for the second minutes digit
▲ ▼

27 Press the "Enter" key




The set time flashes.

28 Press the "Enter" key to apply the time

29 Press the "Esc" key to exit the "TIME" menu item

# Troubleshooting and Maintenance

# Status Diagnosis and Troubleshooting



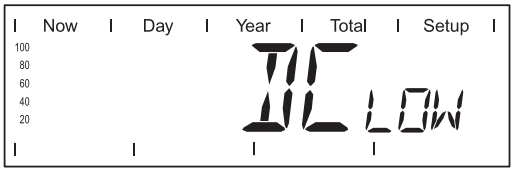
**Displaying Status Codes**

Your inverter is equipped with a self diagnostic system that automatically identifies a large number of possible operation issues by itself and displays them on the screen. This enables you to know immediately if there are any malfunctions in the inverter, the photovoltaic system or any installation or operating errors.

Whenever the self diagnostic system has identified a particular issue, the respective status code is shown on the screen.

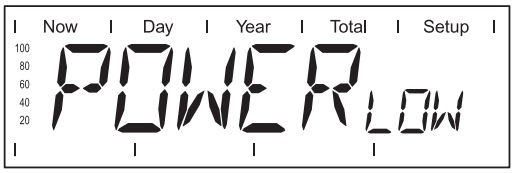
**IMPORTANT!** Status codes may sometimes appear briefly as a result of the control response from the inverter. If it subsequently continues to operate normally, there has not been a system error.

**Normal Operation Status Codes**




The open circuit voltage of the solar modules is too low.

As soon as the open circuit voltage exceeds 290 V, the inverter starts synchronizing with the grid (display shows "SYNC AC").




The total power output of the solar modules is insufficient.

After a short time the inverter resumes grid synchronization (display shows "SYNC AC").

**Total Failure**

If the display remains dark for a long time after sunrise:

- Check the open circuit voltage of the solar modules at the connections of the inverter:

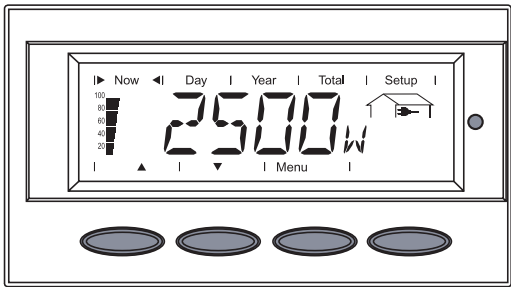
  Open circuit voltage < 265 V ... error in the photovoltaic system

  Open circuit voltage > 265 V ... may indicate a basic fault in the inverter. In this case, notify a Fronius-trained service engineer.

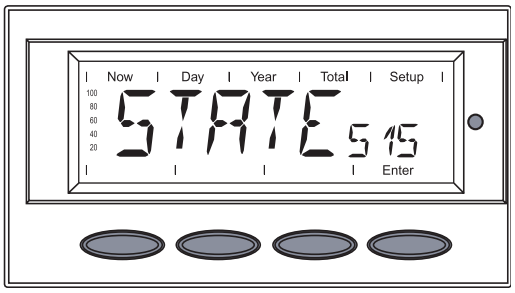
**Status Codes on Fronius IG Plus with Several Power Stage Sets**

A special status diagnostic is run if an error occurs in an inverter with several power stage sets.

It is also possible to call up status codes even if there is no actual error in existence. This form of status polling may be found in the section "The Setup Menu."

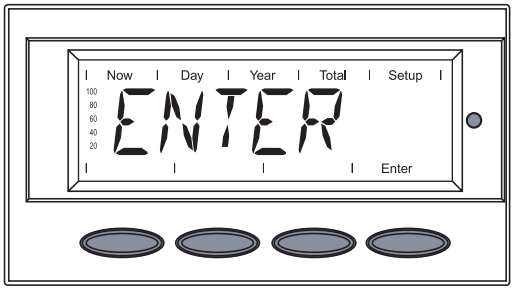



Display during normal operation



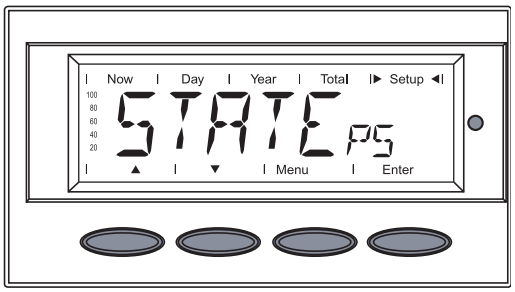

When there is an error in one of the two power stage sets, the display flashes between "STATE" and the corresponding status code
(e.g., "STATE 515")

and



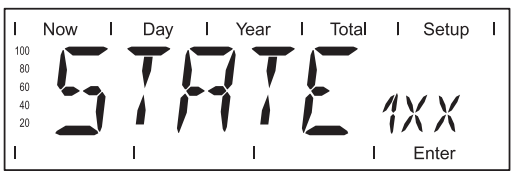

"ENTER"

- Press the "Enter" key twice




- The status display of the power stage sets "STATE PS" appears
- Press the "Enter" key

**Class 1 Status Codes**




Class 1 status codes are typically temporary. Their cause lies in the public grid.

The initial response of the inverter is to disconnect itself from the grid. The grid is subsequently checked for the stipulated monitoring period. If after the end of this period no further defect is identified, your inverter resumes operating and feeding power into the grid.

**IMPORTANT!** The 2nd position x defines the exact network point for the following status codes:
0 = several / all 3 phases
1 = L1
2 = L2
3 = L3

| | |
|---|---|
| **1x2** | |
| AC voltage too high | |
| Behavior | Grid conditions are thoroughly tested and as soon as they are again within the permissible range, the inverter will resume feeding power into the grid. |
| Remedy | Check grid connections and fuses<br>Should the status code persist, you should contact your system installer |
| **1x3** | |
| AC voltage too low | |
| Behavior | Grid conditions are thoroughly tested and as soon as they are again within the permissible range, the inverter will resume feeding power into the grid. |
| Remedy | Check grid connections and fuses<br>Should the status code persist, you should contact your system installer |
| **1x5** | |
| AC frequency too high | |
| Behavior | Grid conditions are thoroughly tested and as soon as they are again within the permissible range, the inverter will resume feeding power into the grid. |
| Remedy | Check grid connections and fuses<br>Should the status code persist, you should contact your system installer |
| **1x6** | |
| AC frequency too low | |
| Behavior | Grid conditions are thoroughly tested and as soon as they are again within the permissible range, the inverter will resume feeding power into the grid. |
| Remedy | Check grid connections and fuses<br>Should the status code persist, you should contact your system installer |
| **1x7** | |
| No AC grid detected | |
| Behavior | Grid conditions are thoroughly tested and as soon as they are again within the permissible range, the inverter will resume feeding power into the grid. |

| | |
|---|---|
| Remedy | Check grid connections and fuses<br>Should the status code persist, you should contact your system installer |

**108**

Islanding detected

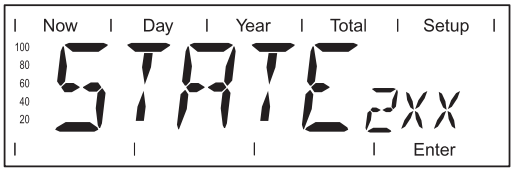
| | |
|---|---|
| Behavior | Grid conditions are thoroughly tested and as soon as they are again within the permissible range, the inverter will resume feeding power into the grid. |
| Remedy | Should the status code persist, you should contact your system installer |

**109**

General grid error
This error is always displayed first for grid errors. After reviewing all power stage sets, the grid error is specified in more detail: 1x1 / 1x4 or the display remains at "109" (e.g., when 2 phases report "104" and one phase "101")

| | |
|---|---|
| Behavior | Grid conditions are thoroughly tested and as soon as they are again within the permissible range, the inverter will resume feeding power into the grid. |
| Remedy | Check grid connections and fuses<br>Should the status code persist, you should contact your system installer |

## Class 2 Status Codes




Status codes of class 2 are typically temporary. Their cause lies in the grid.

The first reaction of the inverter is to disconnect from the grid. Subsequently, the grid will be checked for the duration of the observation period stipulated. If after the end of this period no further defect is identified, the inverter resumes operating and feeding power into the grid.

**IMPORTANT!** The 2nd position x defines the exact network point for the following status messages:
0 = several / all 3 phases
1 = L1
2 = L2
3 = L3

**2x2**

Grid voltage exceeds admissible limits

| | |
|---|---|
| Behavior | As soon as the grid voltage has returned to admissible range, the inverter resumes feeding power into the grid. |
| Remedy | Check grid voltage; if the status code persists you should contact your electrical contractor |

**2x3**

Grid voltage below admissible limits

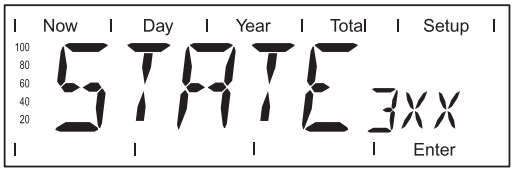
| | |
|---|---|
| Behavior | As soon as the grid voltage has returned to admissible range, the inverter resumes feeding power into the grid. |
| Remedy | Check grid voltage, if the status code persists you should contact your electrical contractor |

**207**

No grid voltage detected

| | |
|---|---|
| Behavior | As soon as the grid conditions have returned to admissible range, the inverter resumes feeding power into the grid. |
| Remedy | Check grid connections and fuses; if the status code does not disappear you should contact your electrical contractor |

## Class 3 Status Codes




Class 3 comprises status codes that may appear during power feed-in mode that do not cause a permanent interruption of the operation of feeding power into the grid.

After automatic disconnection from the grid and waiting for its conditions to return to those stipulated, your inverter will try to resume feed-in operation.

**301**

Overcurrent (AC)

| | |
|---|---|
| Behavior | Short interruption of power feeding into the grid, caused by overcurrent<br>The inverter returns to the startup phase. |
| Remedy | Fault is rectified automatically<br>Should the status code persist, you should contact your system installer |

**302**

Overcurrent (DC)

| | |
|---|---|
| Behavior | Short interruption of power feeding into the grid, caused by overcurrent<br>The inverter returns to the startup phase. |
| Remedy | Fault is rectified automatically<br>Should the status code persist, you should contact your system installer |

**303**

Over-temperature buck converter

| | |
|---|---|
| Behavior | Short interruption of power feeding into the grid caused by over-temperature<br>The inverter returns to the startup phase. |
| Remedy | Fault is rectified automatically<br>If this status code keeps recurring, contact your system installer |

**304**

Over-temperature cooling element

| | |
|---|---|
| Behavior | Short interruption of power feeding into the grid caused by over-temperature.<br>The inverter returns to the startup phase. |
| Remedy | Fault is rectified automatically<br>If this status code keeps recurring, contact your system installer |

**305**

No power transfer to grid possible

| | |
|---|---|
| Behavior | Continual interruption of grid feed operation |
| Remedy | Should the status code persist, you should contact your system installer |

**"POWER LOW" (306)**

Intermediate circuit voltage has dropped below permissible threshold value for feed in.
This error is shown on the inverter in plain text.

| | |
|---|---|
| Behavior | Short interruption of power feeding into the grid.<br>The inverter returns to the startup phase. |
| Remedy | Fault is rectified automatically<br>If this status code keeps recurring, contact your system installer |

**"DC LOW" (307)**

DC input voltage is too low for feed in.
This error is shown on the inverter in plain text.

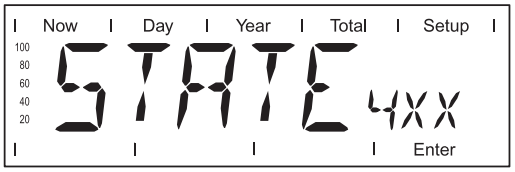
| | |
|---|---|
| Behavior | Short interruption of power feeding into the grid.<br>The inverter returns to the startup phase. |
| Remedy | Fault is rectified automatically<br>If this status code keeps recurring, contact your system installer |

**308**

Intermediate circuit voltage too high.

| | |
|---|---|
| Behavior | Short interruption of power feeding into the grid.<br>The inverter returns to the startup phase. |
| Remedy | Fault is rectified automatically<br>If this status code keeps recurring, contact your system installer |

## Class 4 status codes




Class 4 status codes may require the intervention of a trained Fronius service technician.

USA

**401**

No internal communication with power stage set

| | |
|---|---|
| Description | The inverter will automatically attempt to connect again and, if possible, resume feeding power into the grid |
| Remedy | Check grid connections and fuses<br>If status code persists: Contact a Fronius-trained service technician |

**402**

Communication with EEPROM not possible

| | |
|---|---|
| Description | The inverter will automatically attempt to connect again and, if possible, resume feeding power into the grid. |
| Remedy | If status code persists: Contact a Fronius-trained service technician |

**403**

EEPROM faulty

| | |
|---|---|
| Description | The inverter will automatically attempt to connect again and, if possible, resume feeding power into the grid. |
| Remedy | If status code persists: Contact a Fronius-trained service technician |

**406**

One or both temperature sensors are defective

| | |
|---|---|
| Description | The inverter disconnects from the grid for safety reasons. |
| Remedy | If status code persists: Contact a Fronius-trained service technician |

**407**

Temperature sensor at cooling element defective

| | |
|---|---|
| Description | The inverter disconnects from the grid for safety reasons. |
| Remedy | If status code persists: Contact a Fronius-trained service technician |

**408**

Direct current feed in

| | |
|---|---|
| Description | The inverter disconnects from the grid for safety reasons. |
| Remedy | If status code persists: Contact a Fronius-trained service technician |

**412**

The "fixed voltage" setting has been selected instead of MPP voltage operation and the voltage is set to too low a value, or DC voltage exceeds allowable limits.

| | |
|---|---|
| Description | Fixed voltage lower than the current MPP voltage. |
| Remedy | If the status code persists, you should contact a Fronius-trained service technician, or remove excess solar modules so DC voltage fits within inverter limits.<br>If status code persists: Contact a Fronius-trained service technician |

**413**

Control problems

| | |
|---|---|
| Description | The inverter briefly disconnects from the grid, if AC voltage or frequency are out of range. |
| Remedy | If status code persists: Contact a Fronius-trained service technician |

**414**

EEPROM faulty

| | |
|---|---|
| Description | Memory deleted |
| Remedy | If status code persists: Contact a Fronius-trained service technician |

**416**

Communication with IG Brain not possible.

| | |
|---|---|
| Description | The Operating Status LED lights up orange, then the inverter attempts a restart. |
| Remedy | If status code persists: Contact a Fronius-trained service technician |

**417**

Two power stage sets have the same PCB number

| | |
|---|---|
| Description | The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED |
| Remedy | If status code persists: Contact a Fronius-trained service technician |

**419**

Two or more power stage sets with an identical software serial number detected.

| | |
|---|---|
| Description | The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED |
| Remedy | If status code persists: Contact a Fronius-trained service technician |

**421**

PCB number has been set incorrectly

| | |
|---|---|
| Description | The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED. |
| Remedy | If status code persists: Contact a Fronius-trained service technician |

**425**

Communication with the power stage set is not possible

| | |
|---|---|
| Description | The Operating Status LED lights up orange, then the inverter attempts a restart. |
| Remedy | If status code persists: Contact a Fronius-trained service technician |

**431**

All power stage sets are in boot mode

| | |
|---|---|
| Description | The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED. |
| Remedy | Update firmware using Bootloader or Fronius Solar.update/IG Plus |

**Switches between SLAVE / DC LOW or SLAVE / POWER LOW (439)**

The MPP master power stage set is switched off because of an error in a slave power stage set (in the balance mode).

| | |
|---|---|
| Description | The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED. |
| Remedy | If status code persists: Contact a Fronius-trained service technician |

**442**

No phase master for a phase

| | |
|---|---|
| Description | The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED. |
| Remedy | If status code persists: Contact a Fronius-trained service technician |

**443**

Energy transfer not possible

| | |
|---|---|
| Description | The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED. |
| Remedy | If status code persists: Contact a Fronius-trained service technician |

**445**

Invalid power stage set configuration

| | |
|---|---|
| Description | The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED. |
| Remedy | If status code persists: Contact a Fronius-trained service technician |

**446**

Internal communication error with the NL-MON plug-in card

| | |
|---|---|
| Description | The inverter will automatically attempt to connect again and, if possible, resume feeding power into the grid |
| Remedy | Check grid connections and fuses;<br>If status code persists: Contact a Fronius-trained service technician |

**447**

The NL-MON plug-in card has interrupted grid monitoring

| | |
|---|---|
| Description | The inverter will automatically attempt to connect again and, if possible, resume feeding power into the grid |
| Remedy | If status code persists: Contact a Fronius-trained service technician |

**448**

The neutral conductor N is not connected

| | |
|---|---|
| Description | The inverter disconnects from the grid for safety reasons. |
| Remedy | If status code persists: Contact a Fronius-trained service technician |

**450**

The monitoring of the power stage set main processor ‘Guard’ is active

| | |
|---|---|
| Description | The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED. |
| Remedy | If status code persists: Contact a Fronius-trained service technician |

**451**

The EEPROM Guard Control is defective

| | |
|---|---|
| Description | The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED. |
| Remedy | If status code persists: Contact a Fronius-trained service technician |

**452**

Communication between ‘Guard’ and the digital signal processor (DSP) has been interrupted

| | |
|---|---|
| Description | The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED. |

| | |
|---|---|
| Remedy | If status code persists: Contact a Fronius-trained service technician |

**453**

Error in grid voltage recording

| | |
|---|---|
| Description | The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED. |
| Remedy | If status code persists: Contact a Fronius-trained service technician |

**454**

Error in grid frequency recording

| | |
|---|---|
| Description | The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED. |
| Remedy | If status code persists: Contact a Fronius-trained service technician |

**455**

Reference power source for AC measurement is operating outside of tolerances

| | |
|---|---|
| Description | The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED. |
| Remedy | If status code persists: Contact a Fronius-trained service technician |

**456**

Error during anti-islanding test

| | |
|---|---|
| Description | The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED. |
| Remedy | If status code persists: Contact a Fronius-trained service technician |

**457**

Grid relay stuck

| | |
|---|---|
| Description | The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED. |
| Remedy | If status code persists: Contact a Fronius-trained service technician |

**460**

Reference power source for the digital signal processor (DSP) is operating outside of tolerances

| | |
|---|---|
| Description | The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED. |
| Remedy | If status code persists: Contact a Fronius-trained service technician |

**461**

Error in DSP data memory

| | |
|---|---|
| Description | The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED. |
| Remedy | If status code persists: Contact a Fronius-trained service technician |

**464**

Display error
The software and/or hardware versions of the display and IG Brain are not compatible.

| | |
|---|---|
| Description | The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED. |
| Remedy | Update firmware using Bootloader or Fronius Solar.update/IG Plus |

**465**

Display error
The UI command sent from the IG Brain is not recognized by the present display version.

| | |
|---|---|
| Description | The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED. |
| Remedy | If status code persists: Contact a Fronius-trained service technician |

**466**

Display error
The display was not detected.

| | |
|---|---|
| Description | The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED. |
| Remedy | Check the display for damage, connect display, check ribbon wire for damage, check IG Brain for damage<br>If status code persists: Contact a Fronius-trained service technician |

**467**

The display has not received a start command from the IG Brain for longer than 6 s.

| | |
|---|---|
| Description | The inverter will automatically attempt to connect again and, if possible, resume feeding power into the grid. |
| Remedy | If status code persists: Contact a Fronius-trained service technician |

**469**

Throttle connected to wrong poles

| | |
|---|---|
| Description | The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED. |

| | |
|---|---|
| Remedy | Properly connect throttle<br>If status code persists: Contact a Fronius-trained service technician |

**470**

The buck converter relay does not open at high DC voltage

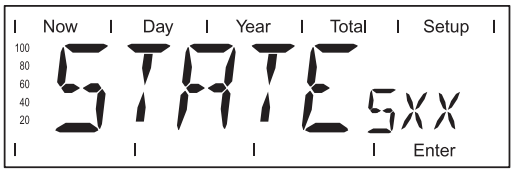
| | |
|---|---|
| Description | The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED. |
| Remedy | Check system configuration<br>If status code persists: Contact a Fronius-trained service technician |

**472**

Ground fault detected

| | |
|---|---|
| Description | Inverter is blocked from feeding energy into the grid. |
| Remedy | Replace GFDI fuse. |

## Class 5 status codes




Class 5 status codes generally do not impair the operation of feeding power into the grid. They will be displayed until the service code is acknowledged by pressing a key (the inverter, however, continues working normally in the background).

- press any key
- error message disappears

**501**

One of the two fans is defective

| | |
|---|---|
| Description | Low power generation because the temperature in the unit is too high. |
| Remedy | If status code persists: Contact a Fronius-trained service technician |

**504**

No Solar Net communication possible

| | |
|---|---|
| Description | Inverter address issued twice. |
| Remedy | Change inverter address (section: ‘The setup menu’) |
| Description | The Solar Net components required are in the inverter: However, communication is still not currently possible. |
| Remedy | Status code will disappear after changing the inverter address |

**505**

EEPROM faulty

| | |
|---|---|
| Description | Data from the Setup menu are lost. |
| Remedy | Remedied automatically |

**506**

EEPROM faulty

| | |
|---|---|
| Description | Data from the ‘Total’ menu are lost. |
| Remedy | Remedied automatically |

**507**

EEPROM faulty

| | |
|---|---|
| Description | Data from the ‘Day’ / ‘Year’ menu are lost. |
| Remedy | Remedied automatically |

**508**

Inverter address incorrect

| | |
|---|---|
| Description | Address for data communication is no longer saved. |
| Remedy | Set address again |

**509**

24h no feed in

| | |
|---|---|
| Description | Example: solar modules covered with snow |
| Remedy | Example: remove snow from solar modules |

**510**

EEPROM faulty

| | |
|---|---|
| Description | SMS settings were restored to default. |
| Remedy | If necessary, reconfigure SMS |

**511**

EEPROM faulty

| | |
|---|---|
| Description | Sensor card settings were restored to default |
| Remedy | If necessary, reconfigure metering channels |

**512**

Too many power stage sets in the system

| | |
|---|---|
| Description | Too many power stage sets have been detected in the system. |
| Remedy | If status code persists: Contact a Fronius-trained service technician |

**513**

Power stage set in boot mode

| | |
|---|---|
| Description | One or more power stage sets cannot be activated, because they are in boot mode. |
| Remedy | Update power stage set firmware |

**514**

No communication with one of the power stage sets

| | |
|---|---|
| Description | Warning message from one of the power stage sets, second power stage set working normally |
| Remedy | If status code persists: Contact a Fronius-trained service technician |

**515**

Faulty plug connections

| | |
|---|---|
| Description | Temperature sensor on cooling element faulty or not connected properly. |
| Remedy | If status code persists: Contact a Fronius-trained service technician |

**516**

Status codes present for one of the power stage sets.

| | |
|---|---|
| Description | It is not possible to activate all power stage sets |
| Remedy | Carry out analysis. For more information, see the 'The setup menu' section. If status code persists: Contact a Fronius-trained service technician |

**517**

Change of master has taken place.

| | |
|---|---|
| Description | Transformer not connected / not plugged in<br>Bridge short-circuit<br>Detection of intermediate circuit voltage damaged |
| Remedy | Check possible errors referred to in 'Description.' If status code persists: Contact a Fronius-trained service technician |

**550**

String fuse defective.

| | |
|---|---|
| Description | One or more string fuses are defective. |
| Remedy | Measure string fuses and replace any that are defective |

**550**

Jumper set incorrectly

| | |
|---|---|
| Description | The jumper on the C-Box PC board was not reset to the 'SMon' position after the solar module strings were checked |
| Remedy | Set the jumper on the C-Box PC board to the 'SMon' position |

**553**

Phase master deactivated due to frequently occurring errors

| | |
|---|---|
| Description | A reintegration of the power stage set into the Mix network will be attempted at a later time. |
| Remedy | If status code persists: Contact a Fronius-trained service technician |

**554**

NL-Mon EEPROM error

| | |
|---|---|
| Description | Default set switch off limits were restored automatically. |
| Remedy | System-specific changes in the ‘Advanced’ service menu have to be redone;<br>If status code persists: Contact a Fronius-trained service technician |

**558**

Feature deactivated (e.g., inverter control via the Fronius Power Control Box option)

| | |
|---|---|
| Description | A feature had to be deactivated (e.g., after component replacement).<br>The status message is no longer displayed after the next DC disconnect. |
| Remedy | Confirm error, update firmware using Bootloader or Fronius Solar.update/IG Plus, if required<br>(The inverter will also operate problem-free without updating the firmware) |

## Customer Service

**IMPORTANT!** Please contact your Fronius dealer or a Fronius-trained service technician if

- an error appears frequently or for a long period of time
- an error appears that is not listed in the tables

# Maintenance

USA

## Safety

**WARNING!** An electric shock can be fatal. Danger from grid voltage and DC voltage from solar modules.

- The connection area should only be opened by a licensed electrician.
- The separate power stage set area should only be disconnected from the connection area after first being disconnected from the grid power.
- The separate power stage set area should only be opened by Fronius-trained service personnel.

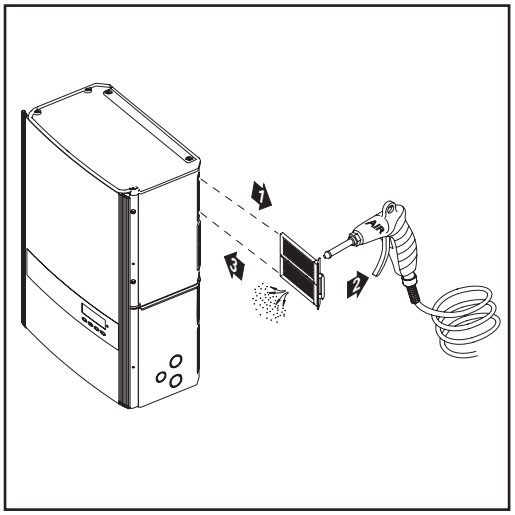
Never work with live wires! Prior to all connection work, make sure that the AC and DC wires are not charged.
The DC main switch is only used to switch off power to the power stage set. When the DC main switch is turned off, the connection area is still energized.
These servicing instructions are for use by qualified personnel only. To reduce the risk of electric shock, do not perform any servicing other than that specified in the operating instructions.

**WARNING!** An electric shock can be fatal. Danger from residual voltage from capacitors.
You must wait until the capacitors have discharged. Discharge takes 5 minutes.

## General

The inverter is designed so that it does not require additional maintenance. However, there are a few points to keep in mind during operation to ensure that the inverter functions optimally.

## Operation in Dusty Environments



When operating the inverter in extremely dusty environments:
Remove the fan cover and clean the integrated fly screen as required

## Opening Fronius IG Plus for service/maintenance

Procedure for opening the inverter for service or maintenance:

1 Disconnect AC and DC supply from the inverter
2 Open the connection area
3 Turn off DC main switch

4 Allow the capacitors to discharge (5 minutes)
5 Remove metal covers
6 Remove the plastic dividers
7 Remove string fuses
8 Disconnect DC wires
9 Disconnect AC wires

# Replacing String Fuses

USA

**Safety**

**WARNING!** An electric shock can be fatal. Danger from grid voltage and DC voltage from solar modules.

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- Never work with live wires! Prior to all connection work, make sure that the AC and DC wires are not charged.
- The DC main switch is used only to switch off power to the power stage set. When the DC main switch is turned off, the connection area is still energized.

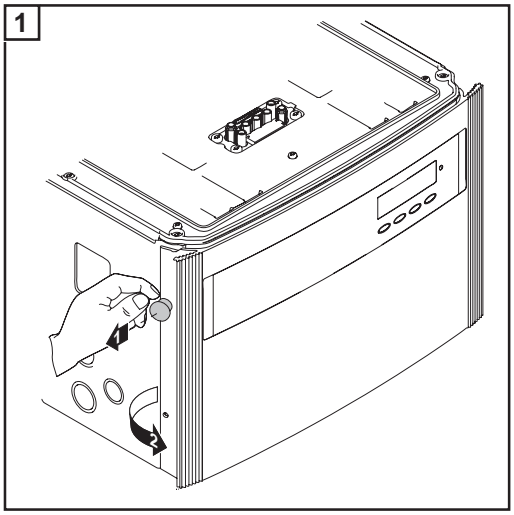
These servicing instructions are for use by qualified personnel only. To reduce the risk of electric shock, do not perform any servicing other than that specified in the operating instructions.

**WARNING!** An electric shock can be fatal. Danger from residual voltage from capacitors.
You must wait until the capacitors have discharged. Discharge takes 5 minutes.

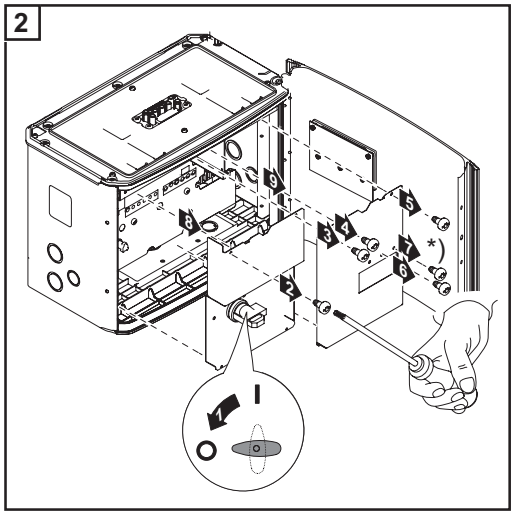
**Preparation**

**NOTE!** Disconnected AC and DC supply from the inverter.

1

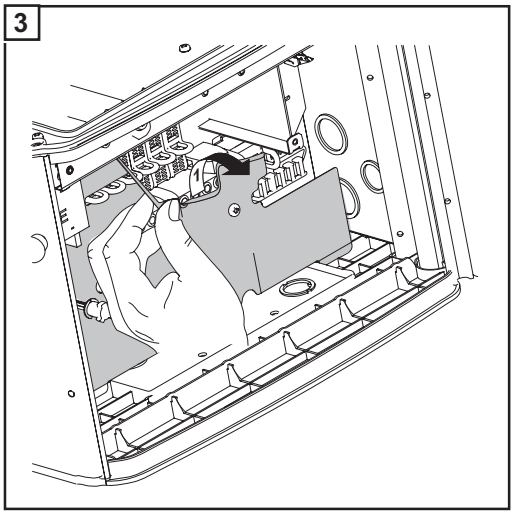


2



*) Remove all fixing screws from any available option cards.

3



Lift up plastic dividers in the area of the string fuses

## Replacing string fuses

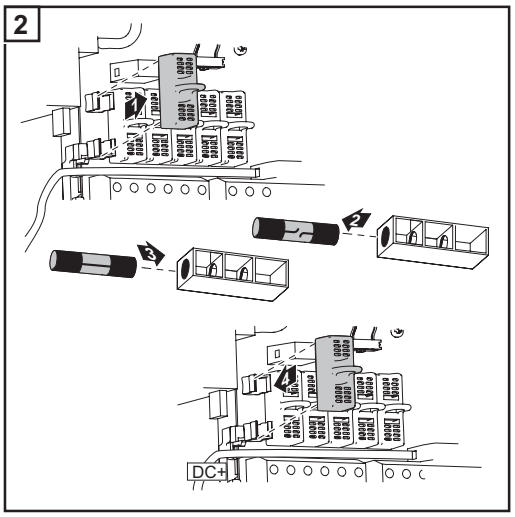
**WARNING!** An electric shock can be fatal. Danger from DC voltage from solar modules.

- Never remove a fuse while it is under load.
- Fuse covers are for installation purposes only. They offer no protection against contact.

1 Test the fuse holder at the terminal for continuity

**NOTE!** Only use fuses for solar modules that meet the criteria for the proper selection of string fuses.
Fuse data: Diameter 0.406 x 1.378 - 1.496 in. (10.3 x 35 - 38 mm), 600 V DC

2

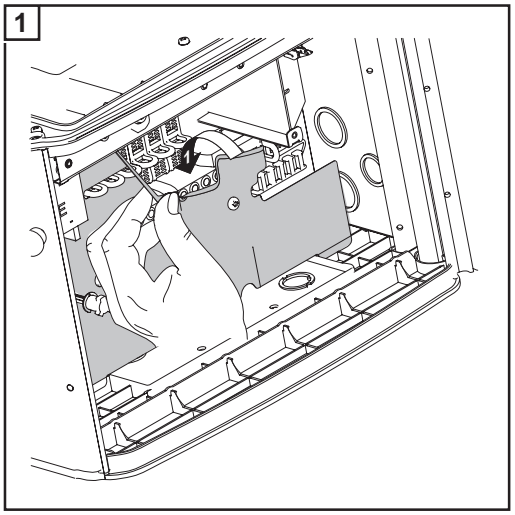



3 After replacing the fuse:

- Find out and correct the cause for the defective fuse

**Closing Fronius IG Plus**

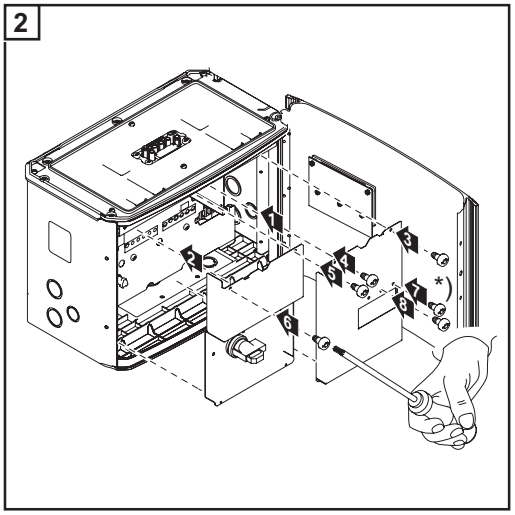
1



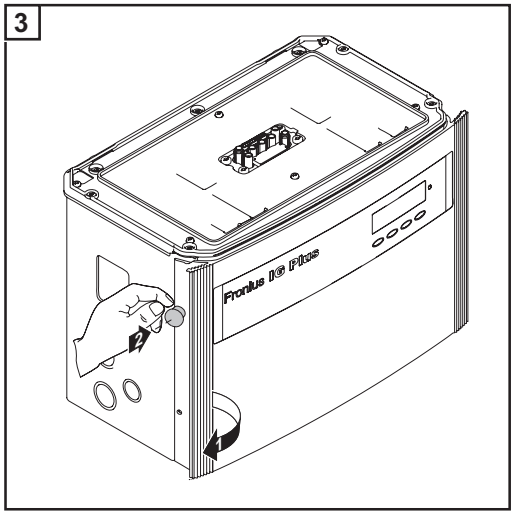
Return plastic dividers to their proper position

**IMPORTANT** Make sure that the plastic dividers are underneath any data communication wires that are present.

2




3




*) Attach all fixing screws from any available option cards.

# Replacing GFDI fuse

**Safety**

**WARNING!** An electric shock can be fatal. Danger from grid voltage and DC voltage from solar modules.

- The connection area should only be opened by a licensed electrician.
- Never work with live wires! Prior to all connection work, make sure that the AC and DC wires are not charged.
- The DC main switch is used only to switch off power to the power stage set. When the DC main switch is turned off, the connection area is still energized.

These servicing instructions are for use by qualified personnel only. To reduce the risk of electric shock, do not perform any servicing other than that specified in the operating instructions.

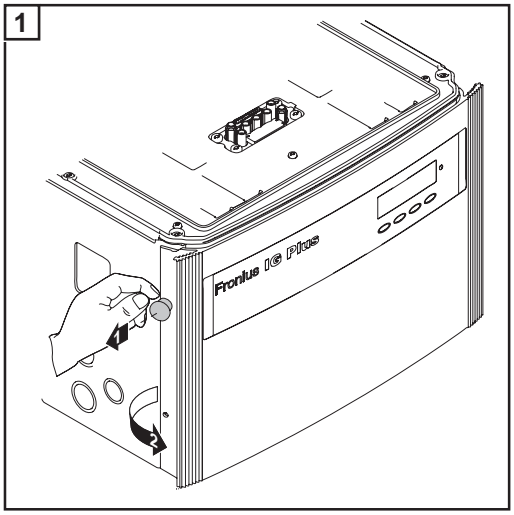
**WARNING!** An electric shock can be fatal. Danger from residual voltage from capacitors.
You must wait until the capacitors have discharged. Discharge takes 5 minutes.

**WARNING!** An electric shock can be fatal. Normally grounded conductors may be ungrounded and energized when a ground fault is indicated. The ground fault has to be repaired before operation is resumed.

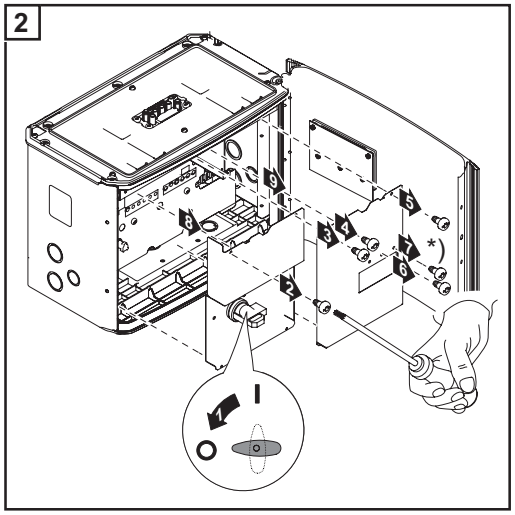
**Preparation**

**NOTE!** Disconnect AC and DC supply from the inverter.

1

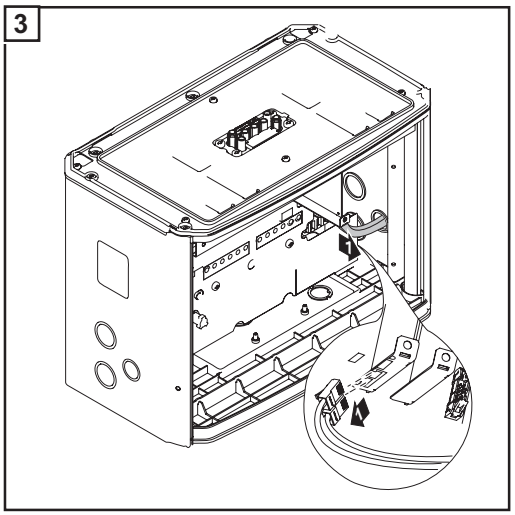



2



*) Remove all fixing screws from any available option cards.

3



If present, disconnect data communication wire from the option cards.

**Replacing GFDI fuse**

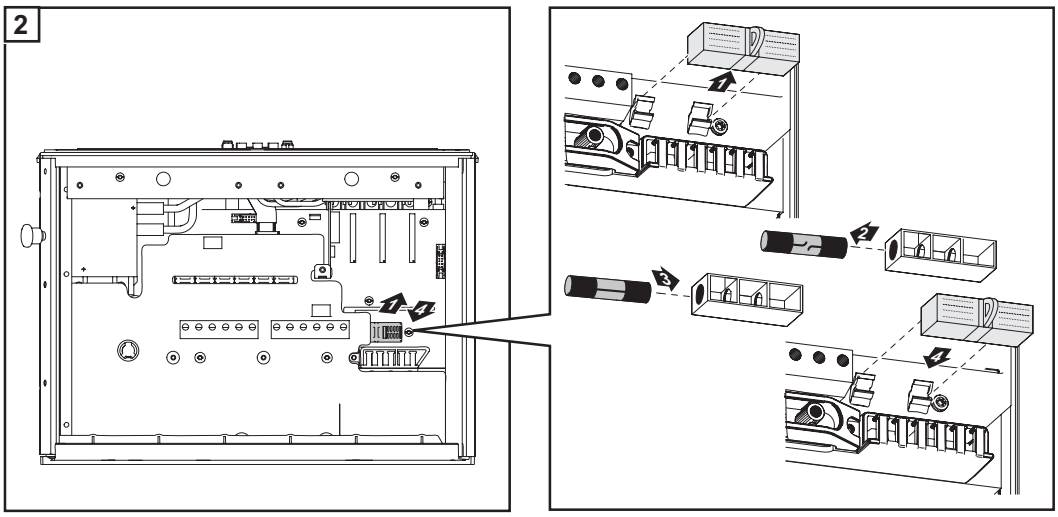
**WARNING!** An electric shock can be fatal. Danger from DC voltage from solar modules.

- Never remove a fuse while it is under load.
- Fuse covers are for installation purposes only. They offer no protection against contact.

1 Test the fuse holder at the terminal for continuity

**NOTE!** Only use fuses that comply with the following data for the GFDI fuse: Diameter 0.406 x 1.378 - 1.496 in. (10.3 x 35 - 38 mm), 1 A, 600 V DC

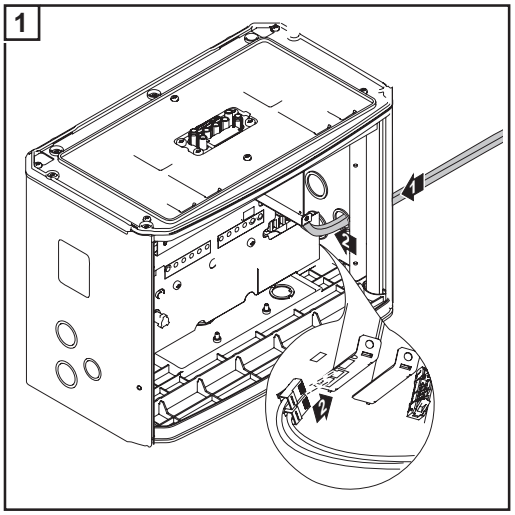
2



3 After replacing the fuse:

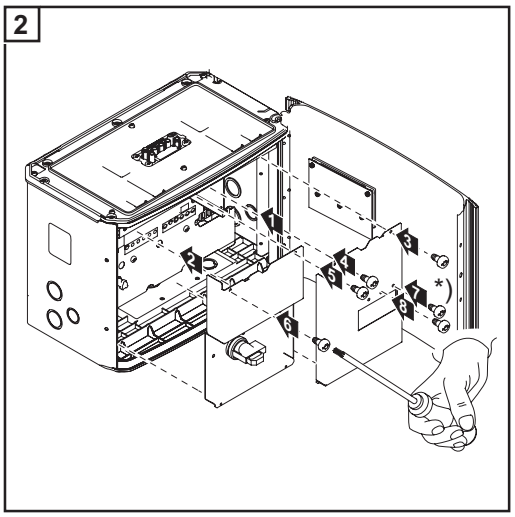
- Find out and correct the cause for the defective fuse

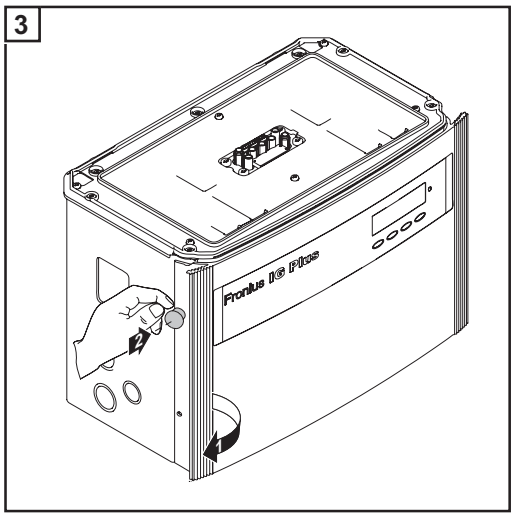
**Closing Fronius IG Plus**




Connect available data communication wire to the option cards.

**IMPORTANT!** Make sure that the plastic dividers are underneath any data communication wires that are present.




*) Attach all fixing screws from any available option cards.

# Appendix

# Technical Data

USA

**Fronius IG Plus 3.0-1**

## Input data

| | |
|---|---|
| Recommended PV power | 2500 - 3450 Wp |
| MPP voltage range | 230 - 500 V DC |
| Max. input voltage<br>(at 1000 W/m² / 14 °C in an open circuit) | 600 V DC |
| Nominal input voltage | 390 V |
| Nominal input current | 8.3 A |
| Max. input current | 14 A |
| Max. array short circuit current | 18 A |

## Output data

| | | |
|---|---|---|
| Nominal output power ($P_{nom}$) | | 3000 W |
| $P_{nom}$ at +122 °F (50 °C) | | 3000 W |
| Max. output power | | 3000 W |
| Nominal AC output voltage | | 208 V / 240 V / 277 V |
| Grid voltage tolerance | | +10 / -12 % |
| Operating AC voltage range default, | at 208 V<br>at 240 V<br>at 277 V | 183 - 229 V<br>211 - 264 V<br>244 - 305 V |
| Adjustment range for voltage, | at 208 V<br>at 240 V<br>at 277 V | 105 - 248 V<br>120 - 287 V<br>140 - 324 V |
| Voltage trip limit accuracy | | 1 % of nominal value |
| Voltage clearing times | | 0.016 - 4.25 s |
| Nominal output current | at 208 V<br>at 240 V<br>at 277 V | 14.4 A AC<br>12.5 A AC<br>10.8 A AC |
| Number of phases | | 1 |
| Maximum output current | at 208 V<br>at 240 V<br>at 277 V | 16.4 A<br>14.2 A<br>12.3 A |
| Maximum continuous utility backfeed current * | | 0 A |
| Synchronization in-rush current * | | 0 A |
| Maximum output fault current / duration | | 222 A / 47 µs |
| Nominal output frequency | | 60 Hz |
| Operating frequency range | | 59.3 - 60.5 Hz |
| Adjustment range for frequency | | 57.0 - 60.48 Hz |
| Frequency trip limit accuracy | | 0.05 Hz |
| Frequency clearing times | | 0.016 - 300 s |
| Harmonic distortion | | < 3 % |
| Power factor | | 1 |

* assured by electrical design of the inverter

**General data**

| | | |
|---|---|---|
| Maximum efficiency | | 96.2 % |
| CEC efficiency | at 208 V<br>at 240 V<br>at 277 V | 95,0 %<br>95.5 %<br>95.5 % |
| Night consumption | | < 1 W |
| Consumption during operation | | 8 W |
| Cooling | | Controlled forced ventilation |
| Degree of protection | | NEMA 3R |
| Unit dimensions w x h x d | | 24.84 x 17.09 x 9.61 in.<br>631 x 434 x 244 mm |
| Power stage set weight | | 31 lbs.<br>14 kg |
| Connection area weight | | 24 lbs.<br>11 kg |
| Shipping dimensions w x h x d | | 31.02 x 20.28 x 14.02 in.<br>788 x 515 x 356 mm |
| Shipping weight | | 59 lbs.<br>27 kg |
| Permissible ambient temperature<br>(with 95% rel. humidity) | | -4 °F - +122 °F<br>- 20 °C - +50 °C |
| Permitted storage temperature<br>(with 95% rel. humidity) | | -4 °F - +140 °F<br>- 20 °C - +60 °C |

**Safety equipment**

| | |
|---|---|
| Ground fault protection | internal GFDI<br>(Ground Fault Detector/Interrupter) |
| Islanding protection | integrated |
| Protection against reverse polarity | integrated |
| Over temperature | output power derating /<br>active cooling |

**Fronius IG Plus 3.8-1**

USA

## Input data

| | |
|---|---|
| Recommended PV power | 3200 - 4400 Wp |
| MPP voltage range | 230 - 500 V DC |
| Max. input voltage<br>(at 1000 W/m² / 14 °C in an open circuit) | 600 V DC |
| Nominal input voltage | 390 V |
| Nominal input current | 10.5 A |
| Max. input current | 17.8 A |
| Max. array short circuit current | 22 A |

## Output data

| | | |
|---|---|---|
| Nominal output power ($P_{nom}$) | | 3800 W |
| $P_{nom}$ at +122 °F (50 °C) | | 3800 W |
| Max. output power | | 3800 W |
| Nominal AC output voltage | | 208 V / 240 V / 277 V |
| Grid voltage tolerance | | +10 / -12 % |
| Operating AC voltage range default, | at 208 V<br>at 240 V<br>at 277 V | 183 - 229 V<br>211 - 264 V<br>244 - 305 V |
| Adjustment range for voltage, | at 208 V<br>at 240 V<br>at 277 V | 105 - 248 V<br>120 - 287 V<br>140 - 324 V |
| Voltage trip limit accuracy | | 1 % of nominal value |
| Voltage clearing times | | 0.016 - 4.25 s |
| Nominal output current | at 208 V<br>at 240 V<br>at 277 V | 18.3 A AC<br>15.8 A AC<br>13.7 A AC |
| Number of phases | | 1 |
| Maximum output current | at 208 V<br>at 240 V<br>at 277 V | 18.5 A<br>18.0 A<br>15.6 A |
| Maximum continuous utility backfeed current * | | 0 A |
| Synchronization in-rush current * | | 0 A |
| Maximum output fault current / duration | | 222 A / 47 µs |
| Nominal output frequency | | 60 Hz |
| Operating frequency range | | 59.3 - 60.5 Hz |
| Adjustment range for frequency | | 57.0 - 60.48 Hz |
| Frequency trip limit accuracy | | 0.05 Hz |
| Frequency clearing times | | 0.016 - 300 s |
| Harmonic distortion | | < 3 % |
| Power factor | | 1 |

* assured by electrical design of the inverter

**General data**

| | | |
|---|---|---|
| Maximum efficiency | | 96.2 % |
| CEC efficiency | at 208 V<br>at 240 V<br>at 277 V | 95,0 %<br>95.5 %<br>95.5 % |
| Night consumption | | < 1 W |
| Consumption during operation | | 8 W |
| Cooling | | Controlled forced ventilation |
| Degree of protection | | NEMA 3R |
| Unit dimensions w x h x d | | 24.84 x 17.09 x 9.61 in.<br>631 x 434 x 244 mm |
| Power stage set weight | | 31 lbs.<br>14 kg |
| Connection area weight | | 24 lbs.<br>11 kg |
| Shipping dimensions w x h x d | | 31.02 x 20.28 x 14.02 in.<br>788 x 515 x 356 mm |
| Shipping weight | | 59 lbs.<br>27 kg |
| Permissible ambient temperature<br>(with 95% rel. humidity) | | -4 °F - +122 °F<br>- 20 °C - +50 °C |
| Permitted storage temperature<br>(with 95% rel. humidity) | | -4 °F - +140 °F<br>- 20 °C - +60 °C |

**Safety equipment**

| | |
|---|---|
| Ground fault protection | internal GFDI<br>(Ground Fault Detector/Interrupter) |
| Islanding protection | integrated |
| Protection against reverse polarity | integrated |
| Over temperature | output power derating /<br>active cooling |

**Fronius IG Plus 5.0-1**

USA

## Input data

| | |
|---|---|
| Recommended PV power | 4250 - 5750 Wp |
| MPP voltage range | 230 - 500 V DC |
| Max. input voltage<br>(at 1000 W/m² / 14 °C in an open circuit) | 600 V DC |
| Nominal input voltage | 390 V |
| Nominal input current | 13.8 A |
| Max. input current | 23.4 A |
| Max. array short circuit current | 29 A |

## Output data

| | | |
|---|---|---|
| Nominal output power ($P_{nom}$) | | 5000 W |
| $P_{nom}$ at +122 °F (50 °C) | | 5000 W |
| Max. output power | | 5000 W |
| Nominal AC output voltage | | 208 V / 240 V / 277 V |
| Grid voltage tolerance | | +10 / -12 % |
| Operating AC voltage range default, | at 208 V<br>at 240 V<br>at 277 V | 183 - 229 V<br>211 - 264 V<br>244 - 305 V |
| Adjustment range for voltage, | at 208 V<br>at 240 V<br>at 277 V | 105 - 248 V<br>120 - 287 V<br>140 - 324 V |
| Voltage trip limit accuracy | | 1 % of nominal value |
| Voltage clearing times | | 0.016 - 4.25 s |
| Nominal output current | at 208 V<br>at 240 V<br>at 277 V | 24.0 A AC<br>20.8 A AC<br>18.1 A AC |
| Number of phases | | 1 |
| Maximum output current | at 208 V<br>at 240 V<br>at 277 V | 27.3 A<br>23.7 A<br>20.5 A |
| Maximum continuous utility backfeed current * | | 0 A |
| Synchronization in-rush current * | | 0 A |
| Maximum output fault current / duration | | 273 A / 72 µs |
| Nominal output frequency | | 60 Hz |
| Operating frequency range | | 59.3 - 60.5 Hz |
| Adjustment range for frequency | | 57.0 - 60.48 Hz |
| Frequency trip limit accuracy | | 0.05 Hz |
| Frequency clearing times | | 0.016 - 300 s |
| Harmonic distortion | | < 3 % |
| Power factor | | 1 |

* assured by electrical design of the inverter

**General data**

| | | |
|---|---|---|
| Maximum efficiency | | 96.2 % |
| CEC efficiency | at 208 V<br>at 240 V<br>at 277 V | 95,5 %<br>95.5 %<br>96.0 % |
| Night consumption | | < 1 W |
| Consumption during operation | | 15 W |
| Cooling | | Controlled forced ventilation |
| Degree of protection | | NEMA 3R |
| Unit dimensions w x h x d | | 36.46 x 17.09 x 9.61 in.<br>926 x 434 x 244 mm |
| Power stage set weight | | 57 lbs.<br>26 kg |
| Connection area weight | | 26 lbs.<br>12 kg |
| Shipping dimensions w x h x d | | 42.72 x 20.28 x 14.02 in.<br>1085 x 515 x 356 mm |
| Shipping weight | | 90 lbs.<br>41 kg |
| Permissible ambient temperature<br>(with 95% rel. humidity) | | -4 °F - +122 °F<br>- 20 °C - +50 °C |
| Permitted storage temperature<br>(with 95% rel. humidity) | | -4 °F - +140 °F<br>- 20 °C - +60 °C |

**Safety equipment**

| | |
|---|---|
| Ground fault protection | internal GFDI<br>(Ground Fault Detector/Interrupter) |
| Islanding protection | integrated |
| Protection against reverse polarity | integrated |
| Over temperature | output power derating /<br>active cooling |

**Fronius IG Plus 6.0-1**

USA

## Input data

| | | |
|---|---|---|
| Recommended PV power | | 5100 - 6900 Wp |
| MPP voltage range | | 230 - 500 V DC |
| Max. input voltage<br>(at 1000 W/m² / 14 °C in an open circuit) | | 600 V DC |
| Nominal input voltage | | 390 V |
| Nominal input current | | 16.6 A |
| Max. input current | | 28.1 A |
| Max. array short circuit current | | 35 A |

## Output data

| | | |
|---|---|---|
| Nominal output power ($P_{nom}$) | | 6000 W |
| $P_{nom}$ at +122 °F (50 °C) | | 6000 W |
| Max. output power | | 6000 W |
| Nominal AC output voltage | | 208 V / 240 V / 277 V |
| Grid voltage tolerance | | +10 / -12 % |
| Operating AC voltage range default, | at 208 V<br>at 240 V<br>at 277 V | 183 - 229 V<br>211 - 264 V<br>244 - 305 V |
| Adjustment range for voltage, | at 208 V<br>at 240 V<br>at 277 V | 105 - 248 V<br>120 - 287 V<br>140 - 324 V |
| Voltage trip limit accuracy | | 1 % of nominal value |
| Voltage clearing times | | 0.016 - 4.25 s |
| Nominal output current | at 208 V<br>at 240 V<br>at 277 V | 28.8 A AC<br>25.0 A AC<br>21.7 A AC |
| Number of phases | | 1 |
| Maximum output current | at 208 V<br>at 240 V<br>at 277 V | 32.8 A<br>28.4 A<br>24.6 A |
| Maximum continuous utility backfeed current * | | 0 A |
| Synchronization in-rush current * | | 0 A |
| Maximum output fault current / duration | | 273 A / 72 µs |
| Nominal output frequency | | 60 Hz |
| Operating frequency range | | 59.3 - 60.5 Hz |
| Adjustment range for frequency | | 57.0 - 60.48 Hz |
| Frequency trip limit accuracy | | 0.05 Hz |
| Frequency clearing times | | 0.016 - 300 s |
| Harmonic distortion | | < 3 % |
| Power factor | | 1 |

* assured by electrical design of the inverter

**General data**

| | | |
|---|---|---|
| Maximum efficiency | | 96.2 % |
| CEC efficiency | at 208 V<br>at 240 V<br>at 277 V | 95,5 %<br>96.0 %<br>96.0 % |
| Night consumption | | < 1 W |
| Consumption during operation | | 15 W |
| Cooling | | Controlled forced ventilation |
| Degree of protection | | NEMA 3R |
| Unit dimensions w x h x d | | 36.46 x 17.09 x 9.61 in.<br>926 x 434 x 244 mm |
| Power stage set weight | | 57 lbs.<br>26 kg |
| Connection area weight | | 26 lbs.<br>12 kg |
| Shipping dimensions w x h x d | | 42.72 x 20.28 x 14.02 in.<br>1085 x 515 x 356 mm |
| Shipping weight | | 90 lbs.<br>41 kg |
| Permissible ambient temperature<br>(with 95% rel. humidity) | | -4 °F - +122 °F<br>- 20 °C - +50 °C |
| Permitted storage temperature<br>(with 95% rel. humidity) | | -4 °F - +140 °F<br>- 20 °C - +60 °C |

**Safety equipment**

| | |
|---|---|
| Ground fault protection | internal GFDI<br>(Ground Fault Detector/Interrupter) |
| Islanding protection | integrated |
| Protection against reverse polarity | integrated |
| Over temperature | output power derating /<br>active cooling |

**Fronius IG Plus 7.5-1**

USA

## Input data

| | |
|---|---|
| Recommended PV power | 6350 - 8600 Wp |
| MPP voltage range | 230 - 500 V DC |
| Max. input voltage<br>(at 1000 W/m² / 14 °C in an open circuit) | 600 V DC |
| Nominal input voltage | 390 V |
| Nominal input current | 20.7 A |
| Max. input current | 35.1 A |
| Max. array short circuit current | 44 A |

## Output data

| | | |
|---|---|---|
| Nominal output power ($P_{nom}$) | | 7500 W |
| $P_{nom}$ at +122 °F (50 °C) | | 7500 W |
| Max. output power | | 7500 W |
| Nominal AC output voltage | | 208 V / 240 V / 277 V |
| Grid voltage tolerance | | +10 / -12 % |
| Operating AC voltage range default, | at 208 V<br>at 240 V<br>at 277 V | 183 - 229 V<br>211 - 264 V<br>244 - 305 V |
| Adjustment range for voltage, | at 208 V<br>at 240 V<br>at 277 V | 105 - 248 V<br>120 - 287 V<br>140 - 324 V |
| Voltage trip limit accuracy | | 1 % of nominal value |
| Voltage clearing times | | 0.016 - 4.25 s |
| Nominal output current | at 208 V<br>at 240 V<br>at 277 V | 36.1 A AC<br>31.3 A AC<br>27.1 A AC |
| Number of phases | | 1 |
| Maximum output current | at 208 V<br>at 240 V<br>at 277 V | 37.0 A<br>35.5 A<br>30.7 A |
| Maximum continuous utility backfeed current * | | 0 A |
| Synchronization in-rush current * | | 0 A |
| Maximum output fault current / duration | | 273 A / 72 µs |
| Nominal output frequency | | 60 Hz |
| Operating frequency range | | 59.3 - 60.5 Hz |
| Adjustment range for frequency | | 57.0 - 60.48 Hz |
| Frequency trip limit accuracy | | 0.05 Hz |
| Frequency clearing times | | 0.016 - 300 s |
| Harmonic distortion | | < 3 % |
| Power factor | | 1 |

* assured by electrical design of the inverter

**General data**

| | | |
|---|---|---|
| Maximum efficiency | | 96.2 % |
| CEC efficiency | at 208 V<br>at 240 V<br>at 277 V | 95,0 %<br>95.5 %<br>96.0 % |
| Night consumption | | < 1 W |
| Consumption during operation | | 15 W |
| Cooling | | Controlled forced ventilation |
| Degree of protection | | NEMA 3R |
| Unit dimensions w x h x d | | 36.46 x 17.09 x 9.61 in.<br>926 x 434 x 244 mm |
| Power stage set weight | | 57 lbs.<br>26 kg |
| Connection area weight | | 26 lbs.<br>12 kg |
| Shipping dimensions w x h x d | | 42.72 x 20.28 x 14.02 in.<br>1085 x 515 x 356 mm |
| Shipping weight | | 90 lbs.<br>41 kg |
| Permissible ambient temperature<br>(with 95% rel. humidity) | | -4 °F - +122 °F<br>- 20 °C - +50 °C |
| Permitted storage temperature<br>(with 95% rel. humidity) | | -4 °F - +140 °F<br>- 20 °C - +60 °C |

**Safety equipment**

| | |
|---|---|
| Ground fault protection | internal GFDI<br>(Ground Fault Detector/Interrupter) |
| Islanding protection | integrated |
| Protection against reverse polarity | integrated |
| Over temperature | output power derating /<br>active cooling |

**Fronius IG Plus 10.0-1**

USA

## Input data

| | | |
|---|---|---|
| Recommended PV power | | 8500 - 11500 Wp |
| MPP voltage range | | 230 - 500 V DC |
| Max. input voltage<br>(at 1000 W/m² / 14 °C in an open circuit) | | 600 V DC |
| Nominal input voltage | | 390 V |
| Nominal input current | | 27.6 A |
| Max. input current | | 46.7 A |
| Max. array short circuit current | | 58 A |

## Output data

| | | |
|---|---|---|
| Nominal output power ($P_{nom}$) | | 9995 W |
| $P_{nom}$ at +122 °F (50 °C) | | 9995 W |
| Max. output power | | 99950 W |
| Nominal AC output voltage | | 208 V / 240 V / 277 V |
| Grid voltage tolerance | | +10 / -12 % |
| Operating AC voltage range default, | at 208 V<br>at 240 V<br>at 277 V | 183 - 229 V<br>211 - 264 V<br>244 - 305 V |
| Adjustment range for voltage, | at 208 V<br>at 240 V<br>at 277 V | 105 - 248 V<br>120 - 287 V<br>140 - 324 V |
| Voltage trip limit accuracy | | 1 % of nominal value |
| Voltage clearing times | | 0.016 - 4.25 s |
| Nominal output current | at 208 V<br>at 240 V<br>at 277 V | 48.1 A AC<br>41.7 A AC<br>36.1 A AC |
| Number of phases | | 1 |
| Maximum output current | at 208 V<br>at 240 V<br>at 277 V | 54.6 A<br>47.4 A<br>40.9 A |
| Maximum continuous utility backfeed current * | | 0 A |
| Synchronization in-rush current * | | 0 A |
| Maximum output fault current / duration | | 568 A / 104 µs |
| Nominal output frequency | | 60 Hz |
| Operating frequency range | | 59.3 - 60.5 Hz |
| Adjustment range for frequency | | 57.0 - 60.48 Hz |
| Frequency trip limit accuracy | | 0.05 Hz |
| Frequency clearing times | | 0.016 - 300 s |
| Harmonic distortion | | < 3 % |
| Power factor | | 1 |

* assured by electrical design of the inverter

**General data**

| | | |
|---|---|---|
| Maximum efficiency | | 96.2 % |
| CEC efficiency | at 208 V<br>at 240 V<br>at 277 V | 95,0 %<br>95.5 %<br>96.0 % |
| Night consumption | | < 1 W |
| Consumption during operation | | 22 W |
| Cooling | | Controlled forced ventilation |
| Degree of protection | | NEMA 3R |
| Unit dimensions w x h x d | | 48.07 x 17.09 x 9.61 in.<br>1221 x 434 x 244 mm |
| Power stage set weight | | 82 lbs.<br>37 kg |
| Connection area weight | | 26 lbs.<br>12 kg |
| Shipping dimensions w x h x d | | 42.72 x 20.28 x 14.02 in. +<br>17.72 x 20.28 x 14.02 in.<br>1085 x 515 x 356 mm +<br>450 x 515 x 356 mm |
| Shipping weight | | 114 lbs.<br>52 kg |
| Permissible ambient temperature<br>(with 95% rel. humidity) | | -4 °F - +122 °F<br>- 20 °C - +50 °C |
| Permitted storage temperature<br>(with 95% rel. humidity) | | -4 °F - +140 °F<br>- 20 °C - +60 °C |

**Safety equipment**

| | |
|---|---|
| Ground fault protection | internal GFDI<br>(Ground Fault Detector/Interrupter) |
| Islanding protection | integrated |
| Protection against reverse polarity | integrated |
| Over temperature | output power derating /<br>active cooling |

**Fronius IG Plus 11.4-1**

USA

## Input data

| | | |
|---|---|---|
| Recommended PV power | | 9700 - 13100 Wp |
| MPP voltage range | | 230 - 500 V DC |
| Max. input voltage<br>(at 1000 W/m² / 14 °C in an open circuit) | | 600 V DC |
| Nominal input voltage | | 390 V |
| Nominal input current | | 31.4 A |
| Max. input current | | 53.3 A |
| Max. array short circuit current | | 67 A |

## Output data

| | | |
|---|---|---|
| Nominal output power ($P_{nom}$) | | 11400 W |
| $P_{nom}$ at +122 °F (50 °C) | | 11400 W |
| Max. output power | | 11400 W |
| Nominal AC output voltage | | 208 V / 240 V / 277 V |
| Grid voltage tolerance | | +10 / -12 % |
| Operating AC voltage range default, | at 208 V<br>at 240 V<br>at 277 V | 183 - 229 V<br>211 - 264 V<br>244 - 305 V |
| Adjustment range for voltage, | at 208 V<br>at 240 V<br>at 277 V | 105 - 248 V<br>120 - 287 V<br>140 - 324 V |
| Voltage trip limit accuracy | | 1 % of nominal value |
| Voltage clearing times | | 0.016 - 4.25 s |
| Nominal output current | at 208 V<br>at 240 V<br>at 277 V | 54.8 A AC<br>47.5 A AC<br>41.2 A AC |
| Number of phases | | 1 |
| Maximum output current | at 208 V<br>at 240 V<br>at 277 V | 55.5 A<br>54.0 A<br>46.7 A |
| Maximum continuous utility backfeed current * | | 0 A |
| Synchronization in-rush current * | | 0 A |
| Maximum output fault current / duration | | 568 A / 104 µs |
| Nominal output frequency | | 60 Hz |
| Operating frequency range | | 59.3 - 60.5 Hz |
| Adjustment range for frequency | | 57.0 - 60.48 Hz |
| Frequency trip limit accuracy | | 0.05 Hz |
| Frequency clearing times | | 0.016 - 300 s |
| Harmonic distortion | | < 3 % |
| Power factor | | 1 |

* assured by electrical design of the inverter

**General data**

| | | |
|---|---|---|
| Maximum efficiency | | 96.2 % |
| CEC efficiency | at 208 V<br>at 240 V<br>at 277 V | 95,5 %<br>96.0 %<br>96.0 % |
| Night consumption | | < 1 W |
| Consumption during operation | | 22 W |
| Cooling | | Controlled forced ventilation |
| Degree of protection | | NEMA 3R |
| Unit dimensions w x h x d | | 48.07 x 17.09 x 9.61 in.<br>1221 x 434 x 244 mm |
| Power stage set weight | | 82 lbs.<br>37 kg |
| Connection area weight | | 26 lbs.<br>12 kg |
| Shipping dimensions w x h x d | | 42.72 x 20.28 x 14.02 in. +<br>17.72 x 20.28 x 14.02 in.<br>1085 x 515 x 356 mm +<br>450 x 515 x 356 mm |
| Shipping weight | | 114 lbs.<br>52 kg |
| Permissible ambient temperature<br>(with 95% rel. humidity) | | -4 °F - +122 °F<br>- 20 °C - +50 °C |
| Permitted storage temperature<br>(with 95% rel. humidity) | | -4 °F - +140 °F<br>- 20 °C - +60 °C |

**Safety equipment**

| | |
|---|---|
| Ground fault protection | internal GFDI<br>(Ground Fault Detector/Interrupter) |
| Islanding protection | integrated |
| Protection against reverse polarity | integrated |
| Over temperature | output power derating /<br>active cooling |

**Fronius IG Plus 11.4-3**

## Input data

| | |
|---|---|
| Recommended PV power | 9700 - 13100 Wp |
| MPP voltage range | 230 - 500 V DC |
| Max. input voltage<br>(at 1000 W/m² / 14 °C in an open circuit) | 600 V DC |
| Nominal input voltage | 390 V |
| Nominal input current | 31.4 A |
| Max. input current | 53.3 A |
| Max. array short circuit current | 67 A |

## Output data

| | | |
|---|---|---|
| Nominal output power ($P_{nom}$) | | 11400 W |
| $P_{nom}$ at +122 °F (50 °C) | | 11400 W |
| Max. output power | | 11400 W |
| Nominal AC output voltage | | 208 V / 240 V |
| Grid voltage tolerance | | +10 / -12 % |
| Operating AC voltage range default, | at 208 V<br>at 240 V | 183 - 229 V<br>211 - 264 V |
| Adjustment range for voltage, | at 208 V<br>at 240 V | 105 - 248 V<br>120 - 287 V |
| Voltage trip limit accuracy | | 1 % of nominal value |
| Voltage clearing times | | 0.016 - 4.25 s |
| Nominal output current | at 208 V<br>at 240 V | 31.6 A AC<br>27.4 A AC |
| Number of phases | | 3 |
| Maximum output current | at 208 V<br>at 240 V | 32.0 A<br>31.2 A |
| Maximum continuous utility backfeed current * | | 0 A |
| Synchronization in-rush current * | | 0 A |
| Maximum output fault current / duration | | 476 A / 623 µs |
| Nominal output frequency | | 60 Hz |
| Operating frequency range | | 59.3 - 60.5 Hz |
| Adjustment range for frequency | | 57.0 - 60.48 Hz |
| Frequency trip limit accuracy | | 0.05 Hz |
| Frequency clearing times | | 0.016 - 300 s |
| Harmonic distortion | | < 3 % |
| Power factor | | 1 |

* assured by electrical design of the inverter

**General data**

| | | |
|---|---|---|
| Maximum efficiency | | 96.2 % |
| CEC efficiency | at 208 V<br>at 240 V | 95,0 %<br>95.5 % |
| Night consumption | | < 1 W |
| Consumption during operation | | 22 W |
| Cooling | | Controlled forced ventilation |
| Degree of protection | | NEMA 3R |
| Unit dimensions w x h x d | | 48.07 x 17.09 x 9.61 in.<br>1221 x 434 x 244 mm |
| Power stage set weight | | 82 lbs.<br>37 kg |
| Connection area weight | | 26 lbs.<br>12 kg |
| Shipping dimensions w x h x d | | 42.72 x 20.28 x 14.02 in. +<br>17.72 x 20.28 x 14.02 in.<br>1085 x 515 x 356 mm +<br>450 x 515 x 356 mm |
| Shipping weight | | 114 lbs.<br>52 kg |
| Permissible ambient temperature<br>(with 95% rel. humidity) | | -4 °F - +122 °F<br>- 20 °C - +50 °C |
| Permitted storage temperature<br>(with 95% rel. humidity) | | -4 °F - +140 °F<br>- 20 °C - +60 °C |

**Safety equipment**

| | |
|---|---|
| Ground fault protection | internal GFDI<br>(Ground Fault Detector/Interrupter) |
| Islanding protection | integrated |
| Protection against reverse polarity | integrated |
| Over temperature | output power derating /<br>active cooling |

**Fronius IG Plus 12.0-3**

USA

## Input data

| | |
|---|---|
| Recommended PV power | 10200 - 13800 Wp |
| MPP voltage range | 230 - 500 V DC |
| Max. input voltage<br>(at 1000 W/m² / 14 °C in an open circuit) | 600 V DC |
| Nominal input voltage | 390 V |
| Nominal input current | 33.1 A |
| Max. input current | 56.1 A |
| Max. array short circuit current | 70 A |

## Output data

| | | |
|---|---|---|
| Nominal output power ($P_{nom}$) | | 12000 W |
| $P_{nom}$ at +122 °F (50 °C) | | 12000 W |
| Max. output power | | 12000 W |
| Nominal AC output voltage | | 277 V |
| Grid voltage tolerance | | +10 / -12 % |
| Operating AC voltage range default, | at 277 V | 244 - 305 V |
| Adjustment range for voltage, | at 277 V | 140 - 324 V |
| Voltage trip limit accuracy | | 1 % of nominal value |
| Voltage clearing times | | 0.016 - 4.25 s |
| Nominal output current | at 277 V | 14.4 A AC |
| Number of phases | | 3 |
| Maximum output current | at 277 V | 16.4 A |
| Maximum continuous utility backfeed current * | | 0 A |
| Synchronization in-rush current * | | 0 A |
| Maximum output fault current / duration | | 777 A / 163 µs |
| Nominal output frequency | | 60 Hz |
| Operating frequency range | | 59.3 - 60.5 Hz |
| Adjustment range for frequency | | 57.0 - 60.48 Hz |
| Frequency trip limit accuracy | | 0.05 Hz |
| Frequency clearing times | | 0.016 - 300 s |
| Harmonic distortion | | < 3 % |
| Power factor | | 1 |

* assured by electrical design of the inverter

**General data**

| | | |
|---|---|---|
| Maximum efficiency | | 96.2 % |
| CEC efficiency | at 277 V | 96 % |
| Night consumption | | < 1 W |
| Consumption during operation | | 22 W |
| Cooling | | Controlled forced ventilation |
| Degree of protection | | NEMA 3R |
| Unit dimensions w x h x d | | 48.07 x 17.09 x 9.61 in.<br>1221 x 434 x 244 mm |
| Power stage set weight | | 82 lbs.<br>37 kg |
| Connection area weight | | 26 lbs.<br>12 kg |
| Shipping dimensions w x h x d | | 42.72 x 20.28 x 14.02 in. +<br>17.72 x 20.28 x 14.02 in.<br>1085 x 515 x 356 mm +<br>450 x 515 x 356 mm |
| Shipping weight | | 114 lbs.<br>52 kg |
| Permissible ambient temperature<br>(with 95% rel. humidity) | | -4 °F - +122 °F<br>- 20 °C - +50 °C |
| Permitted storage temperature<br>(with 95% rel. humidity) | | -4 °F - +140 °F<br>- 20 °C - +60 °C |

**Safety equipment**

| | |
|---|---|
| Ground fault protection | internal GFDI<br>(Ground Fault Detector/Interrupter) |
| Islanding protection | integrated |
| Protection against reverse polarity | integrated |
| Over temperature | output power derating /<br>active cooling |

**Field adjustable trip points**

| Field adjustable trip points | 208 V | 240 V | 277 V |
|---|---|---|---|
| Nominal AC output voltage, Line-to-Line, [V] | 208 | 240 | 277 |
| Operating AC voltage range default, Line-to-Line, [V] | 183-229 | 211-264 | - |
| Adjustment range for voltage, Line-to-Line, [V] | 105-248 | 121-287 | - |
| Voltage trip limit accuracy Line-to-Line, [% of nominal value] | 1 | 1 | - |
| Operating AC voltage range default, Line-to-Neutral, [V] | 106-132 | 106-132 | 244-305 |
| Adjustment range for voltage, Line-to-Neutral, [V] | 61-143 | 61-143 | 138-324 |
| Adjustment range for voltage clearing time [s] | 0.016-4.25 | 0.016-4.25 | 0.016-4.25 |
| Voltage trip limit accuracy Line-to-Neutral, [% of nominal value] | 1 | 1 | 1 |
| Nominal output frequency [Hz] | 60 | 60 | 60 |
| Operating frequency range [Hz] | 59.3-60.5 | 59.3-60.5 | 59.3-60.5 |
| Adjustment range for frequency [Hz] | 57.0-60.48 | 57.0-60.48 | 57.0-60.48 |
| Adjustment range for frequency clearing time [s] | 0.016-300 | 0.016-300 | 0.016-300 |
| Frequency trip limit accuracy [ms] | 16.66 (1) | 16.66 (1) | 16.66 (1) |
| Detection time [ms] | 25 (2) | 25 (2) | 25 (2) |
| Reconnect time default [s] | 300 | 300 | 300 |
| Adjustment range for reconnect time [s] | 5-900 | 5-900 | 5-900 |

(1) 16.66 ms are equivalent to 1 cycle

(2) 25 ms are equivalent to 1.5 cycles

# Relevant Standards and Directives

**Relevant standards and directives**

- UL 1741-2005
- IEEE 1547-2003
- IEEE 1547.1
- ANSI/IEEE C62.41
- FCC Part 15 A & B
- NEC Article 690
- C22. 2 No. 107.1-01 (September 2001)

**Grid Failure**

The standard measurement and safety procedures integrated into the inverter ensure that the power feed is immediately interrupted in the event of a grid failure (shut-off by the utility or damage to lines).

# Warranty and Disposal



**FRONIUS USA limited 10-year warranty**

At Fronius, we have been designing and manufacturing high quality power electronics equipment for over 60 years. And all our production facilities are ISO 9001 certified.

You will probably not encounter any service-related issues with your Fronius IG Plus Solar Inverter.
However, in the unlikely event that within Ten (10) years from the original purchase you discover a problem caused by defects in either workmanship or materials, we will see that the device is either repaired or replaced.
Repair or replacement depends on Fronius's evaluation of the issue and what we decide makes the most sense according to the situation.
The warranty is based on the inverter's serial number, allowing the warranty to be transferred to another owner if the Fronius IG Plus solar inverter remains installed in the original installation location. Because the warranty is tied to the serial number, there is no paperwork to transfer the warranty to a new owner.

The Fronius IG Plus Solar Inverters are designed to withstand normal operating conditions and typical wear and tear when the Fronius IG Plus Solar Inverter is used for its original intent, in compliance with the Fronius IG Plus Installation and Operational Manual(s) supplied with the original equipment.
This warranty does not cover damages by improper installation or operation, misuse, abuse, manipulation, alterations or repair attempts, accidents, fire, floods, acts of God, and incidental or consequential damage caused by defects with other components of the solar system. This warranty does not extend beyond the original cost of the Fronius IG Plus Solar Inverter.

**Policy and procedure for warranty returns and repairs**

To obtain service you must follow this policy and procedure for warranty returns and repairs:

- All returned Fronius IG Plus Solar Inverters require a Returned Merchandise Authorization Number (RMA).
- A request for an RMA number requires the following information:
  - Proof of purchase in the form of the original invoice
  - Model number of the Fronius IG Plus solar inverter
  - Serial number of the Fronius IG Plus inverter
  - Description of the problem
  - Shipping address for the repaired or replaced equipment
- All Fronius IG Plus solar inverters authorized for return by FRONIUS USA must be returned in their original shipping container or packaging providing equal protection.
- Shipping costs to FRONIUS USA and back to the purchaser of repaired or replacement Fronius IG Plus Solar Inverters is the responsibility of FRONIUS USA
- The warranty period of any repaired or replacement inverter is 12 months after shipment from FRONIUS USA or the original warranty period which ever is later
- Labor costs related to uninstalling the defective equipment and re-installing the repaired or replacement equipment are not covered under the warranty.

Some states do not allow the exclusion or limitation of incidental or consequential damages. This warranty gives you specific legal rights, and you may also have other rights, which vary from state to state.

FRONIUS USA LLC General Terms and Conditions apply.

Contact your local dealer or FRONIUS Service Partner for immediate handling of warranty issues. For service assistance to resolve a Fronius IG Plus solar inverter problem, or for product information please contact:

FRONIUS USA LLC - Solar Electronics Division
10421 Citation Drive, Suite 1100, Brighton, MI 48116
E-mail: pv-us@fronius.com
http://www.fronius-usa.com

**Disposal**

Should your inverter be replaced at some future date, Fronius will accept the obsolete equipment back and provide for its proper recycling.

CSA INTERNATIONAL

# Certificate of Compliance

| | | | |
|---|---|---|---|
| **Certificate:** | 2065918 | **Master Contract:** | 203213 |
| **Project:** | 2065918 | **Date Issued:** | 2008/09/09 |

**Issued to:** **Fronius International GmbH**

**Guenter Fronius Strasse 1**
**Wels-Thalheim, 4600**
**Austria**
**Attention: Mr. Josef Feichtinger**

***The products listed below are eligible to bear the CSA Mark shown with adjacent indicator 'US'***

US

**Issued by:** Rob Hempstock, AScT.

**Authorized by:** Lindsay Clark, Product Group Manager

**PRODUCTS**

**CLASS 5311 89** - POWER SUPPLIES - Distributed Generation - Power Systems Equipment
- Certified to U.S. Standards

Utility Interactive Inverter, Models Fronius IG Plus 3.0-1 UNI, Fronius IG Plus 3.8-1 UNI, SunPower SPR-3300f, SunPower SPR-4000f, Fronius IG Plus 5.0-1 UNI, Fronius IG Plus 6.0-1 UNI, Fronius IG Plus 7.5-1 UNI, SunPower SPR-6500f, SunPower SPR-8000f, Fronius IG Plus 10.0-1 UNI, Fronius IG Plus 11.4-1 UNI, and Fronius IG Plus 12.0-3 WYE277, permanently connected.

For details related to rating, size, configuration, etc., reference should be made to the CSA Certification Record or the Descriptive Report or Attachment 1.

The 'US' indicator adjacent to the CSA Mark signifies that the product has been evaluated to the applicable ANSI/UL Standards, for use in the U.S.. This 'US' indicator includes products eligible to bear the 'NRTL' indicator. NRTL, i.e. National Recognized Testing Laboratory, is a designation granted by the U.S. Occupational Safety and Health Administration (OSHA) to laboratories which have been recognized to perform certification to U.S. Standards.

DQD 507 Rev. 2004-06-30

| | | | |
|---|---|---|---|
| **Certificate:** | 2065918 | **Master Contract:** | 203213 |
| **Project:** | 2065918 | **Date Issued:** | 2008/09/09 |

**APPLICABLE REQUIREMENTS**

UL Std. No. 1741-First Edition - Static Inverters and Charge Controllers for Use in Photovoltaic Power Systems (Including Revisions through and including November 7, 2005)

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Under http://www.fronius.com/addresses you will find all addresses of our sales branches and partner firms!